

A quick reference guide

Sensitivity analyses for leaching models used for pesticide registration in Europe

I.G. Dubus, C.D. Brown & S. Beulke

**MAFF project PL0532
SSLRC project JF3741E**



Soil Survey and Land Research Centre

A quick reference guide

**Sensitivity analyses for leaching models
used for pesticide registration in Europe**

by

Igor G. Dubus, Colin D. Brown & Sabine Beulke

Final report
September 2000

MAFF Project PL0532
SSLRC Contract No. JF 3741E



Soil Survey and Land Research Centre

Cranfield University, Silsoe, Beds MK45 4DT, UK

Tel: 01525 863000

Fax 01525 863253

E-mail: soil.survey@cranfield.ac.uk

Web: <http://www.cranfield.ac.uk/sslrc/>

Foreword

This document is intended to summarise specific results from a project funded by MAFF/PSD entitled *Sensitivity analyses for leaching models used for pesticide registration in Europe* (PL0532). It only focuses on results from the one-at-a-time sensitivity analyses which were carried out and it is not designed to be used without the two other main documents that have been produced within the scope of this project.

The preferred reference to this document is as follows:

DUBUS I.G., BROWN C.D. & BEULKE S. (2000). Sensitivity analyses for leaching models used for pesticide registration in Europe – A quick reference guide. SSLRC report for MAFF PL0532, Silsoe, Beds., UK, 82p.

References of the two other main documents are:

DUBUS I.G., BROWN C.D. & BEULKE S. (2000). Sensitivity analyses for leaching models used for pesticide registration in Europe. SSLRC report for MAFF PL0532, Silsoe, Beds., UK, 85p.

DUBUS I.G., BROWN C.D. & BEULKE S. (2000). Sensitivity analyses for leaching models used for pesticide registration in Europe - Appendices. SSLRC report for MAFF PL0532, Silsoe, Beds., UK, 238p.

Disclaimer

Every effort has been made to ensure that all information in this document is correct at the time of publication. However, MAFF, Cranfield University and the authors do not accept liability for any error or omission in the content, or for the consequences of the use of the information presented.

Information contain herein does not necessarily reflect the policy or views of MAFF or the Pesticides Safety Directorate.

One-at-a-time sensitivity analysis for MACRO (version 4.1)

Abbreviation	Parameter description
ANNAMP	Temperature annual amplitude
ANNTAV	Average annual temperature
ASCALE	Effective diffusion pathlength
BETA	Root adaptability factor
CANCAP	Canopy Interception Capacity
CANDEG	Canopy degradation rate
CFORM	Form factor
CRITAIR	Critical soil air content for root water uptake
CTEN	Boundary soil water tension
DEG	degradation rates
DFORM	Form factor
DIFF	Diffusion coefficient in water
DV	Dispersivity
EXPB	Exponent moisture relation
FEXT	Canopy wash-off coefficient
FRACMAC	Fraction sorption sites macropores
FREUND	Freundlich exponent
GAMMA	Bulk density
KSATMIN	Saturated hydraulic conductivity
KSM	Boundary hydraulic conductivity
LAIHAR	Leaf Area Index at harvest
LAIMAX	Max Leaf Area Index
LAIMIN	Leaf Area Index at zdatemin
RINTEN	Rainfall intensity
ROOTINIT	Root Depth at zdatemin
ROOTMAX	Max root depth
RPIN	Root distribution
TEMPINI	Initial soil temperature
THETAINI	Initial soil moisture
TPORV	Saturated water content
TRESP	Exponent Temperature response
WATEN	Critical water tension for root water uptake
WILT	Wilting point
XMPOR	Boundary soil water content
ZALP	Correction factor for wet canopy evaporation
ZFINT	Fraction of irrigation intercepted by canopy
ZHMIN	Crop height at zdatemin
ZKD	Sorption coefficient
ZLAMB	Pore size distribution index
ZM	Tortuosity factor micropores
ZMIX	Mixing depth
ZN	Pore size distribution factor macropores

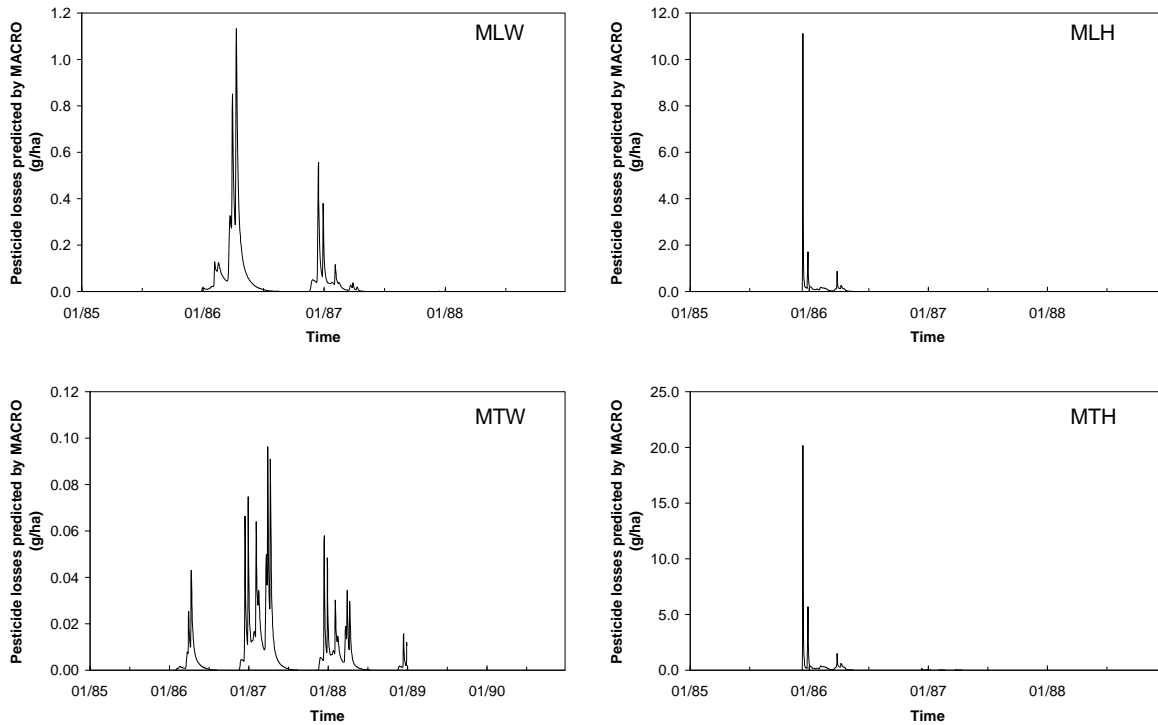
List of MACRO parameters included in the sensitivity analyses

	Percolation (mm)				Pesticide losses at 1-m depth (g/ha)			
	MLW	MTW	MLH	MTH	MLW	MTW	MLH	MTH
1985	242	242	230	230	0.02	<0.01	23.87	51.06
1986	283	283	271	271	29.80	1.45	15.83	33.61
1987	283	283	271	271	3.99	4.10	0.11	2.47
1988	286	286	273	273	0.01	1.60	<0.01	0.15
1989	-	283	-	-	-	0.32	-	-
1990	-	283	-	-	-	0.05	-	-

Annual percolation and pesticide losses predicted by MACRO for the four scenarios

	MLW	MTW	MLH	MTH
Number of years	4	6	4	4
Total percolation (mm)	1094	1660	1045	1045
Total pesticide losses at 1-m depth (g/ha)	33.82	7.52	39.80	87.29
Total pesticide losses at 1-m depth (% applied)	1.69	0.38	1.99	4.36

Accumulated percolation and pesticide losses predicted by MACRO for the four scenarios



Daily pesticide losses predicted by MACRO for the four scenarios (g/ha)

Variation of parameters (MLW)

Variations were attributed through the yellow cells

Nominal values		Variation range					
Site parameters		Lower val.	Upper val.	Percentage of variation	Percentage of variation	Multiplication factor	Multiplication factor
ANNAMP	8	6	10	-25	25	0.75	1.25
ANNNAV	8	6	10	-25	25	0.75	1.25
RINTEN	2	1	4	-50.00	100.00	0.5	2
Initial/Boundary conditions							
TEMPINI	8	6	10	-25	25	0.75	1.25
THETAINI	27.75	20.8125	34.6875	-25	25	0.75	1.25
Solute transport							
DIFF	4.60E-10	1.00E-10	1.00E-09	-78.26	117.39	0.22	2.17
DV	1	0.20	5	-80.00	400.00	0.20	5.00
ZMIX	1	0.25	20	-75.00	1900.00	0.25	20.00
Pesticide parameters							
CANDEG	0.0893	0.04465	0.1786	-50.00	100.00	0.5	2
DEG	0.0893	0.04465	0.1786	-50.00	100.00	0.5	2
EXPB	0.7	0.42	0.98	-40	40	0.60	1.40
FEXT	0.01	0.005	0.02	-50.00	100.00	0.5	2
FRACMAC	0.02	0.01	0.10	-75.00	400.00	0.25	5.00
FREUND	0.9	0.72	1.08	-20	20	0.80	1.20
TRESP	0.08	0.06	0.1	-25	25	0.75	1.25
ZKD	0.34	0.17	0.68	-50.00	100.00	0.5	2
Physical/Hydraulic parameters							
ASCALE	20	10	40	-50.00	100.00	0.5	2
CTEN	10	5	20	-50.00	100.00	0.5	2
GAMMA	1.35	1.215	1.485	-10	10	0.90	1.10
KSATMIN	120	30	480	-75.00	300.00	0.25	4
KSM	0.492	0.246	0.738	-50	50	0.50	1.50
TPORV	46.56	41.904	51.216	-10	10	0.90	1.10
WILT	10.54	9.486	11.594	-10	10	0.90	1.10
XMPOR	35.71	32.139	39.281	-10	10	0.90	1.10
ZLAMB	0.163	0.0815	0.326	-50	100	0.50	2.00
ZM	0.5	0.25	1	-50	100	0.50	2.00
ZN	4.4	3.96	4.84	-10	10	0.90	1.10
Crop parameters							
BETA	0.2	0.1	0.4	-50.00	100.00	0.50	2.00
CANCAP	2	1	4	-50.00	100.00	0.50	2.00
CFORM	1.7	1.3	2.0	-23.53	17.65	0.76	1.18
CRITAIR	5	2	8	-60.00	60.00	0.40	1.60
DFORM	0.7	0.5	0.8	-28.57	14.29	0.71	1.14
LAIHAR	1	0.5	2.0	-50.00	100.00	0.50	2.00
LAIMAX	6.2	5.2	7.2	-16.13	16.13	0.84	1.16
LAIMIN	1	0.5	2.0	-50.00	100.00	0.50	2.00
ROOTINIT	0.2	0.1	0.4	-50.00	100.00	0.50	2.00
ROOTMAX	0.8	0.6	1.0	-25.00	25.00	0.75	1.25
RPIN	70	60	80	-14.29	14.29	0.86	1.14
WATEN	5	1	20	-80.00	300.00	0.20	4.00
ZALP	1	1.0	1.3	0.00	30.00	1.00	1.30
ZHMIN	0.15	0.1	0.2	-33.33	33.33	0.67	1.33
Irrigation							
ZFINT	0.1	0.05	0.20	-50.00	100.00	0.50	2.00

Variation attributed to MACRO input parameters
Pesticide L on Wick scenario

Variation of parameters (MTW)

Variations were attributed through the yellow cells

Nominal values		Variation range					
Site parameters		Lower val.	Upper val.	Percentage of variation	Percentage of variation	Multiplication factor	Multiplication factor
ANNAMP	8	6	10	-25	25	0.75	1.25
ANNNAV	8	6	10	-25	25	0.75	1.25
RINTEN	2	1	4	-50.00	100.00	0.5	2
Initial/Boundary conditions							
TEMPINI	8	6	10	-25	25	0.75	1.25
THETAINI	27.75	20.8125	34.6875	-25	25	0.75	1.25
Solute transport							
DIFF	4.60E-10	1.00E-10	1.00E-09	-78.26	117.39	0.22	2.17
DV	1	0.20	5	-80.00	400.00	0.20	5.00
ZMIX	1	0.25	20	-75.00	1900.00	0.25	20.00
Pesticide parameters							
CANDEG	0.0298	0.0149	0.0596	-50.00	100.00	0.5	2
DEG	0.0298	0.0149	0.0596	-50.00	100.00	0.5	2
EXPB	0.7	0.42	0.98	-40	40	0.60	1.40
FEXT	0.01	0.005	0.02	-50.00	100.00	0.5	2
FRACMAC	0.02	0.01	0.10	-75.00	400.00	0.25	5.00
FREUND	0.9	0.72	1.08	-20	20	0.80	1.20
TRESP	0.08	0.06	0.1	-25	25	0.75	1.25
ZKD	1.7	0.85	3.4	-50.00	100.00	0.5	2
Physical/Hydraulic parameters							
ASCALE	20	10	40	-50.00	100.00	0.5	2
CTEN	10	5	20	-50.00	100.00	0.5	2
GAMMA	1.35	1.215	1.485	-10	10	0.90	1.10
KSATMIN	120	30	480	-75.00	300.00	0.25	4
KSM	0.492	0.246	0.738	-50	50	0.50	1.50
TPORV	46.56	41.904	51.216	-10	10	0.90	1.10
WILT	10.54	9.486	11.594	-10	10	0.90	1.10
XMPOR	35.71	32.139	39.281	-10	10	0.90	1.10
ZLAMB	0.163	0.0815	0.326	-50	100	0.50	2.00
ZM	0.5	0.25	1	-50	100	0.50	2.00
ZN	4.4	3.96	4.84	-10	10	0.90	1.10
Crop parameters							
BETA	0.2	0.1	0.4	-50.00	100.00	0.50	2.00
CANCAP	2	1	4	-50.00	100.00	0.50	2.00
CFORM	1.7	1.3	2.0	-23.53	17.65	0.76	1.18
CRITAIR	5	2	8	-60.00	60.00	0.40	1.60
DFORM	0.7	0.5	0.8	-28.57	14.29	0.71	1.14
LAIHAR	1	0.5	2.0	-50.00	100.00	0.50	2.00
LAIMAX	6.2	5.2	7.2	-16.13	16.13	0.84	1.16
LAIMIN	1	0.5	2.0	-50.00	100.00	0.50	2.00
ROOTINIT	0.2	0.1	0.4	-50.00	100.00	0.50	2.00
ROOTMAX	0.8	0.6	1.0	-25.00	25.00	0.75	1.25
RPIN	70	60	80	-14.29	14.29	0.86	1.14
WATEN	5	1	20	-80.00	300.00	0.20	4.00
ZALP	1	1.0	1.3	0.00	30.00	1.00	1.30
ZHMIN	0.15	0.1	0.2	-33.33	33.33	0.67	1.33
Irrigation							
ZFINT	0.1	0.05	0.20	-50.00	100.00	0.50	2.00

Variation attributed to MACRO input parameters
Pesticide T on Wick scenario

Variation of parameters (MLH)

Variations were attributed through the yellow cells

Nominal values		Variation range					
Site parameters		Lower val.	Upper val.	Percentage of variation	Percentage of variation	Multiplication factor	Multiplication factor
ANNAMP	8	6	10	-25	25	0.75	1.25
ANNNAV	8	6	10	-25	25	0.75	1.25
RINTEN	2	1	4	-50.00	100.00	0.5	2
Initial/Boundary conditions							
TEMPINI	8	6	10	-25	25	0.75	1.25
THETAINI	34.9	26.175	43.625	-25	25	0.75	1.25
Solute transport							
DIFF	4.60E-10	1.00E-10	1.00E-09	-78.26	117.39	0.22	2.17
DV	1	0.20	5	-80.00	400.00	0.20	5.00
ZMIX	1	0.25	20	-75.00	1900.00	0.25	20.00
Pesticide parameters							
CANDEG	0.0893	0.04465	0.1786	-50.00	100.00	0.5	2
DEG	0.0893	0.04465	0.1786	-50.00	100.00	0.5	2
EXPB	0.7	0.42	0.98	-40	40	0.60	1.40
FEXT	0.01	0.005	0.02	-50.00	100.00	0.5	2
FRACMAC	0.02	0.01	0.04	-50.00	100.00	0.50	2.00
FREUND	0.9	0.72	1.08	-20	20	0.80	1.20
TRESP	0.08	0.06	0.1	-25	25	0.75	1.25
ZKD	0.23	0.115	0.46	-50.00	100.00	0.5	2
Physical/Hydraulic parameters							
ASCALE	20	10	40	-50.00	100.00	0.5	2
CTEN	18	9	36	-50.00	100.00	0.5	2
GAMMA	1.39	1.251	1.529	-10	10	0.90	1.10
KSATMIN	39.25	9.8125	157	-75.00	300.00	0.25	4
KSM	0.088	0.044	0.44	-50	400	0.50	5.00
TPORV	46.8	42.12	51.48	-10	10	0.90	1.10
WILT	16.8	15.12	18.48	-10	10	0.90	1.10
XMPOR	38.74	34.866	42.614	-10	10	0.90	1.10
ZLAMB	0.084	0.042	0.168	-50	100	0.50	2.00
ZM	0.5	0.25	1	-50	100	0.50	2.00
ZN	4.92	4.428	5.412	-10	10	0.90	1.10
Crop parameters							
BETA	0.2	0.1	0.4	-50.00	100.00	0.50	2.00
CANCAP	2	1	4	-50.00	100.00	0.50	2.00
CFORM	1.7	1.3	2.0	-23.53	17.65	0.76	1.18
CRITAIR	5	2	8	-60.00	60.00	0.40	1.60
DFORM	0.7	0.5	0.8	-28.57	14.29	0.71	1.14
LAIHAR	1	0.5	2.0	-50.00	100.00	0.50	2.00
LAIMAX	6.2	5.2	7.2	-16.13	16.13	0.84	1.16
LAIMIN	1	0.5	2.0	-50.00	100.00	0.50	2.00
ROOTINIT	0.2	0.1	0.4	-50.00	100.00	0.50	2.00
ROOTMAX	0.8	0.6	1.0	-25.00	25.00	0.75	1.25
RPIN	70	60	80	-14.29	14.29	0.86	1.14
WATEN	20	10	30	-50.00	50.00	0.50	1.50
ZALP	1	1.0	1.3	0.00	30.00	1.00	1.30
ZHMIN	0.15	0.1	0.2	-33.33	33.33	0.67	1.33
Irrigation							
ZFINT	0.1	0.05	0.20	-50.00	100.00	0.50	2.00

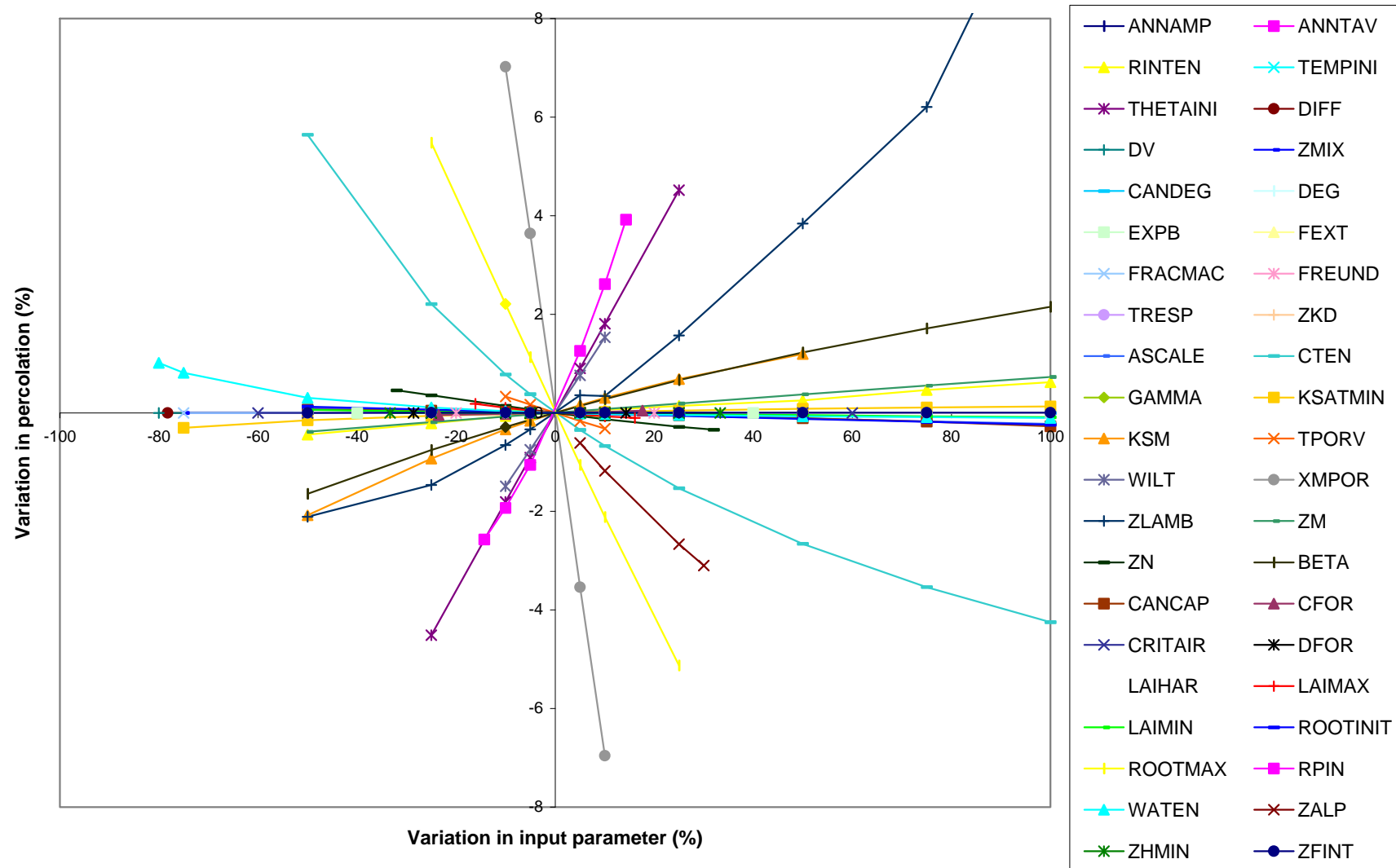
Variation attributed to MACRO input parameters
Pesticide L on Hodnet scenario

Variation of parameters (MTH)

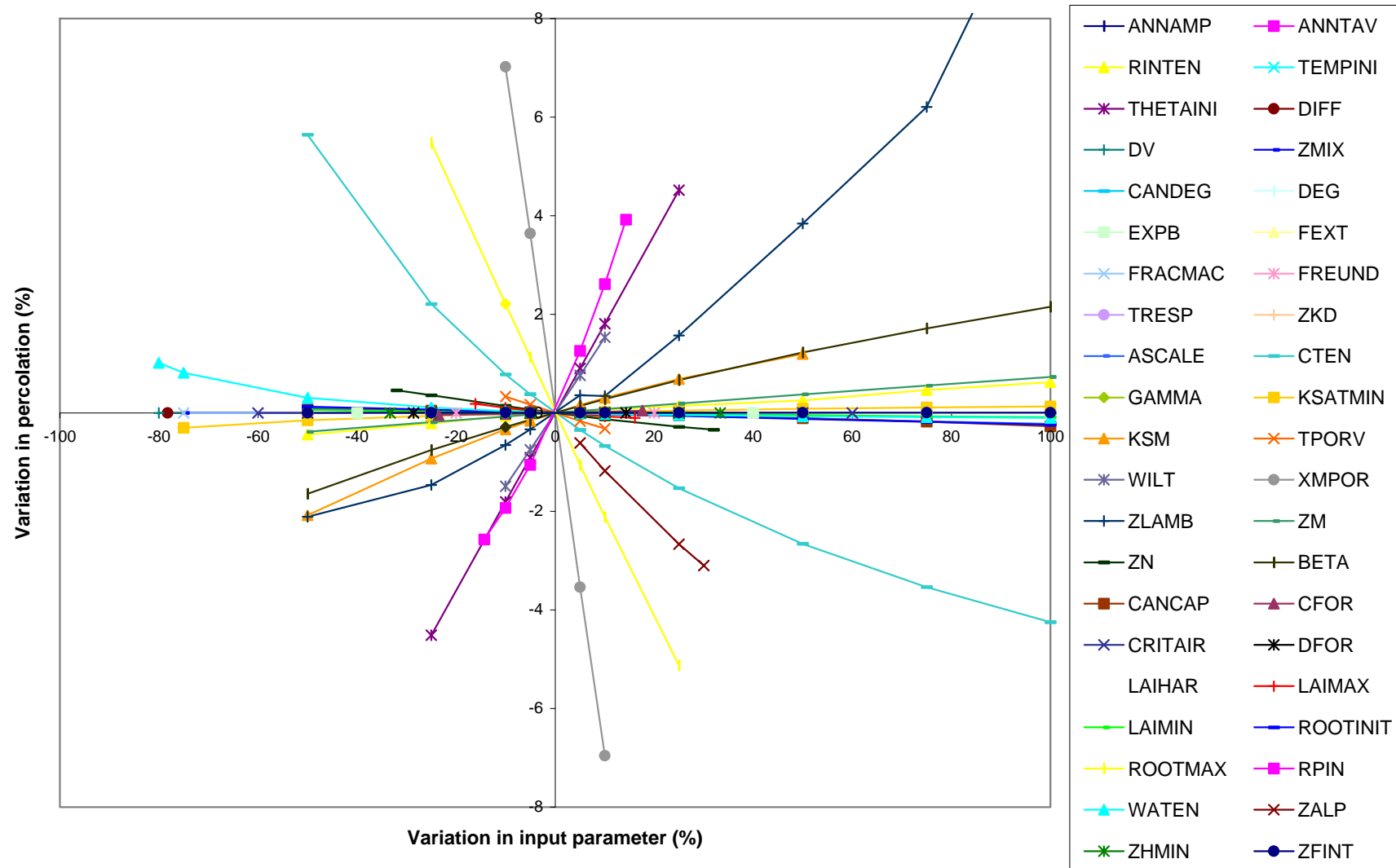
Variations were attributed through the yellow cells

Nominal values		Variation range					
Site parameters		Lower val.	Upper val.	Percentage of variation	Percentage of variation	Multiplication factor	Multiplication factor
ANNAMP	8	6	10	-25	25	0.75	1.25
ANNNAV	8	6	10	-25	25	0.75	1.25
RINTEN	2	1	4	-50.00	100.00	0.5	2
Initial/Boundary conditions							
TEMPINI	8	6	10	-25	25	0.75	1.25
THETAINI	34.9	26.175	43.625	-25	25	0.75	1.25
Solute transport							
DIFF	4.60E-10	1.00E-10	1.00E-09	-78.26	117.39	0.22	2.17
DV	1	0.20	5	-80.00	400.00	0.20	5.00
ZMIX	1	0.25	20	-75.00	1900.00	0.25	20.00
Pesticide parameters							
CANDEG	0.0298	0.0149	0.0596	-50.00	100.00	0.5	2
DEG	0.0298	0.0149	0.0596	-50.00	100.00	0.5	2
EXPB	0.7	0.42	0.98	-40	40	0.60	1.40
FEXT	0.01	0.005	0.02	-50.00	100.00	0.5	2
FRACMAC	0.02	0.01	0.04	-50.00	100.00	0.50	2.00
FREUND	0.9	0.72	1.08	-20	20	0.80	1.20
TRESP	0.08	0.06	0.1	-25	25	0.75	1.25
ZKD	1.15	0.575	2.3	-50.00	100.00	0.5	2
Physical/Hydraulic parameters							
ASCALE	20	10	40	-50.00	100.00	0.5	2
CTEN	18	9	36	-50.00	100.00	0.5	2
GAMMA	1.39	1.251	1.529	-10	10	0.90	1.10
KSATMIN	39.25	9.8125	157	-75.00	300.00	0.25	4
KSM	0.088	0.044	0.44	-50	400	0.50	5.00
TPORV	46.8	42.12	51.48	-10	10	0.90	1.10
WILT	16.8	15.12	18.48	-10	10	0.90	1.10
XMPOR	38.74	34.866	42.614	-10	10	0.90	1.10
ZLAMB	0.084	0.042	0.168	-50	100	0.50	2.00
ZM	0.5	0.25	1	-50	100	0.50	2.00
ZN	4.92	4.428	5.412	-10	10	0.90	1.10
Crop parameters							
BETA	0.2	0.1	0.4	-50.00	100.00	0.50	2.00
CANCAP	2	1	4	-50.00	100.00	0.50	2.00
CFORM	1.7	1.3	2.0	-23.53	17.65	0.76	1.18
CRITAIR	5	2	8	-60.00	60.00	0.40	1.60
DFORM	0.7	0.5	0.8	-28.57	14.29	0.71	1.14
LAIHAR	1	0.5	2.0	-50.00	100.00	0.50	2.00
LAIMAX	6.2	5.2	7.2	-16.13	16.13	0.84	1.16
LAIMIN	1	0.5	2.0	-50.00	100.00	0.50	2.00
ROOTINIT	0.2	0.1	0.4	-50.00	100.00	0.50	2.00
ROOTMAX	0.8	0.6	1.0	-25.00	25.00	0.75	1.25
RPIN	70	60	80	-14.29	14.29	0.86	1.14
WATEN	20	10	30	-50.00	50.00	0.50	1.50
ZALP	1	1.0	1.3	0.00	30.00	1.00	1.30
ZHMIN	0.15	0.1	0.2	-33.33	33.33	0.67	1.33
Irrigation							
ZFINT	0.1	0.05	0.20	-50.00	100.00	0.50	2.00

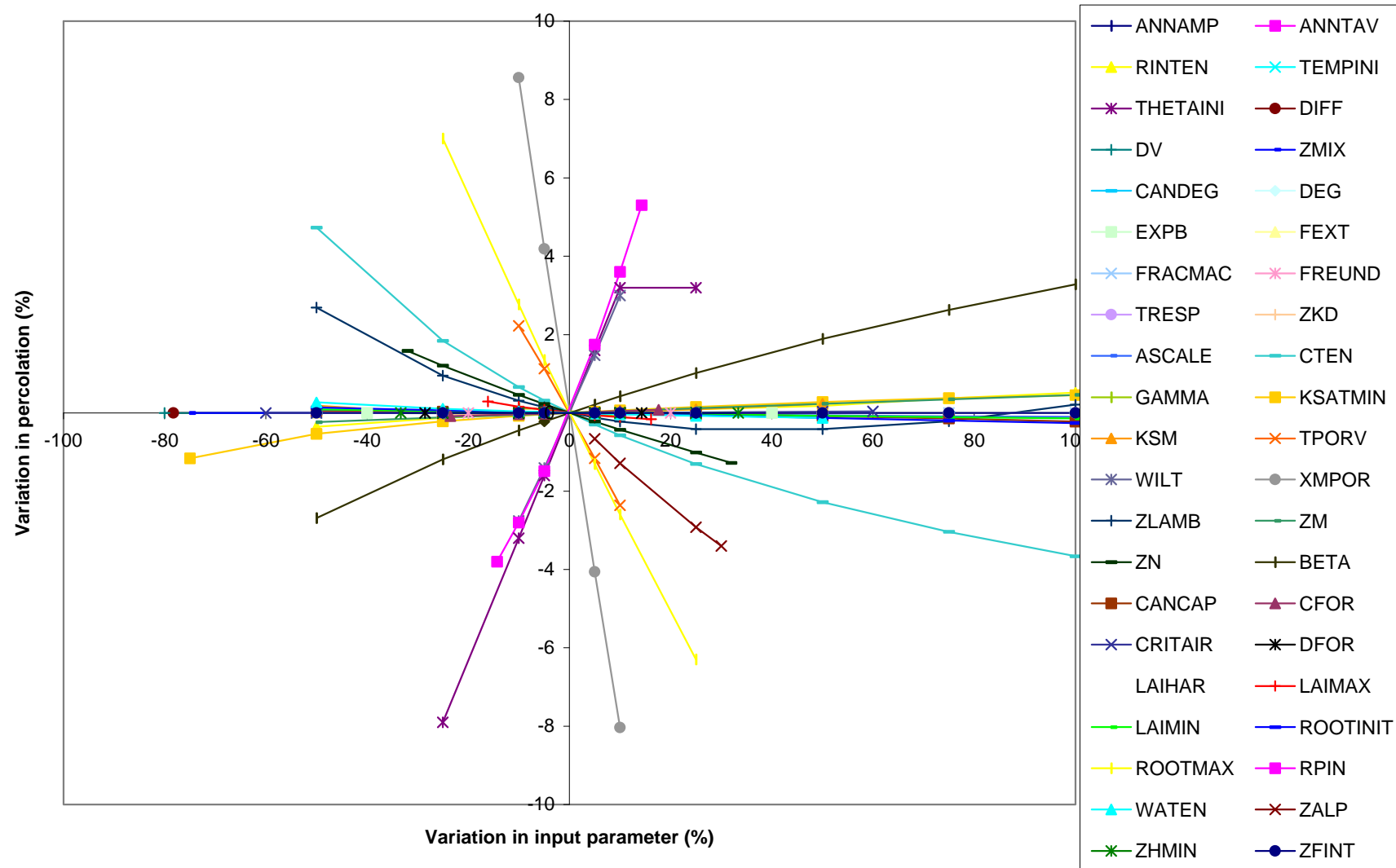
Variation attributed to MACRO input parameters
Pesticide T on Hodnet scenario



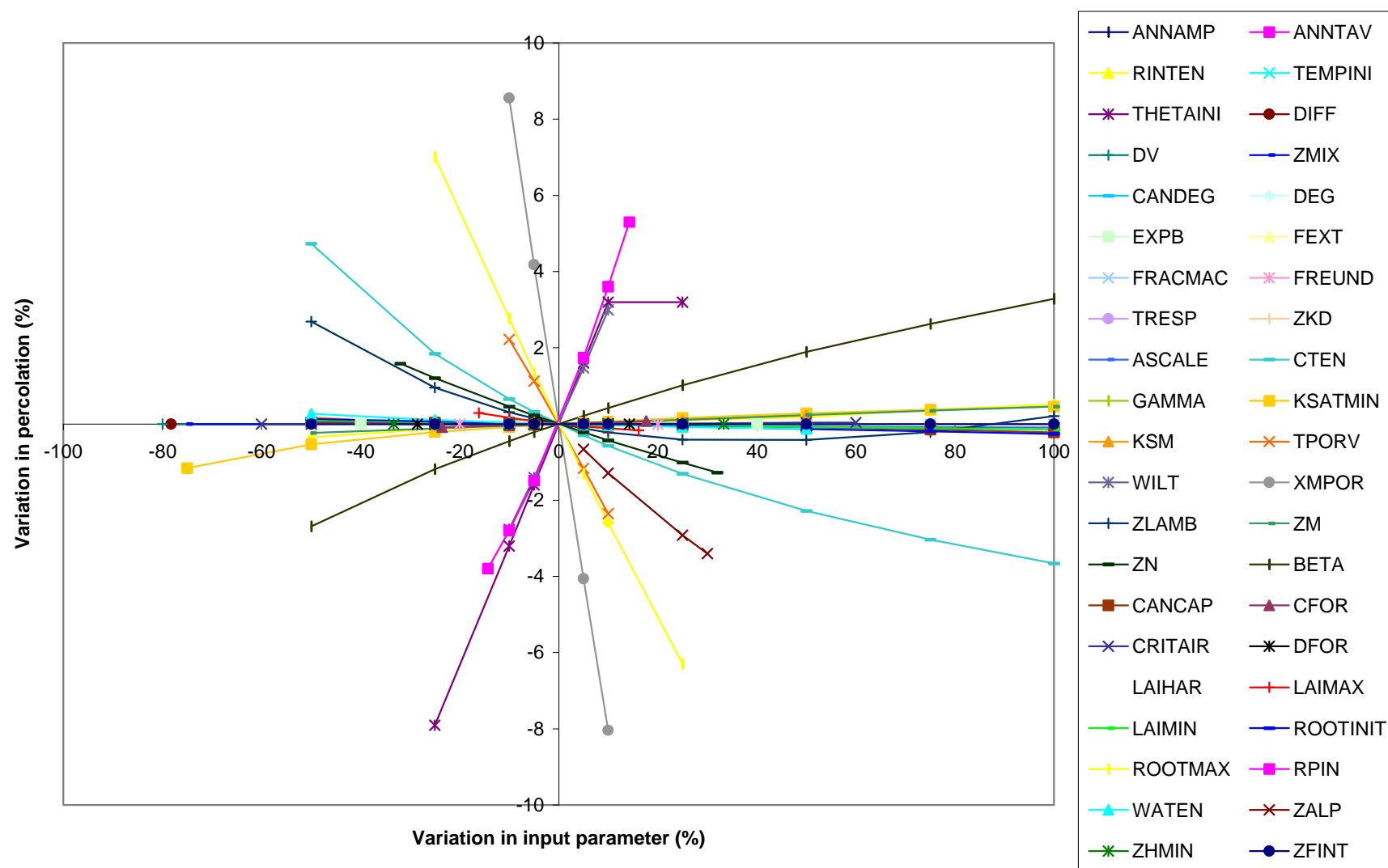
Influence of the variation of input parameters on percolation predicted by MACRO
Pesticide L on Wick scenario



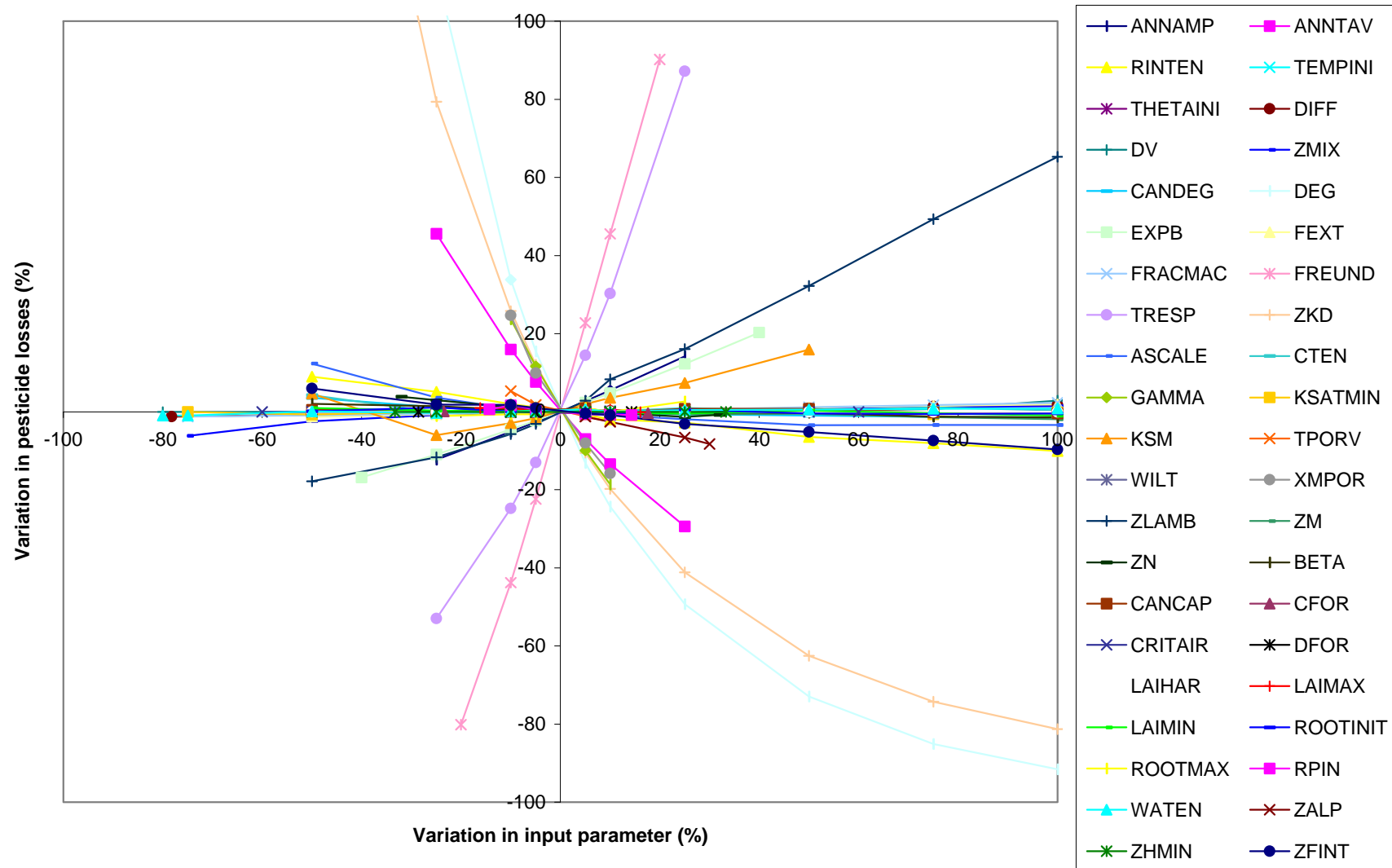
Influence of the variation of input parameters on percolation predicted by MACRO
Pesticide T on Wick scenario



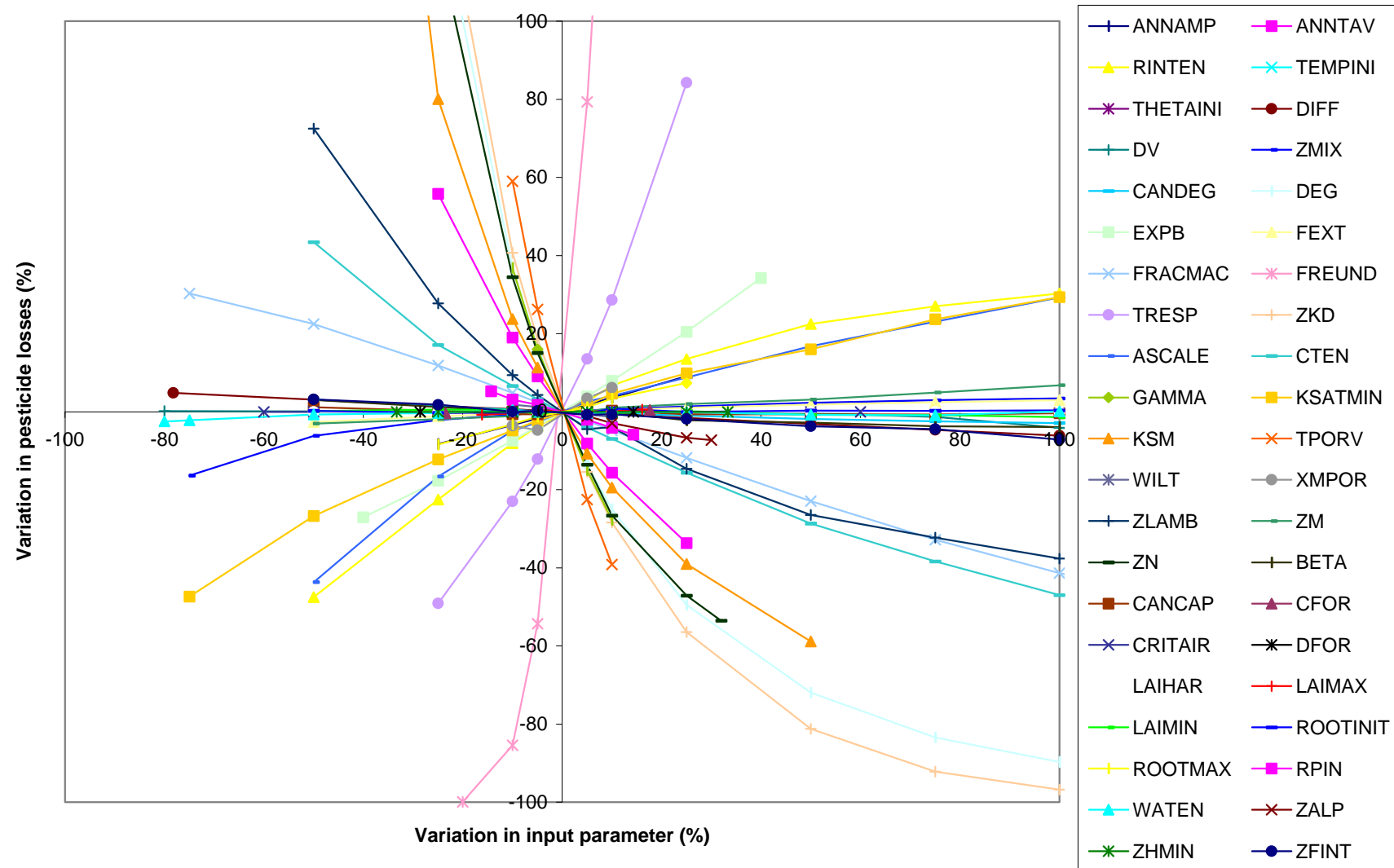
Influence of the variation of input parameters on percolation predicted by MACRO
Pesticide L on Hodnet scenario



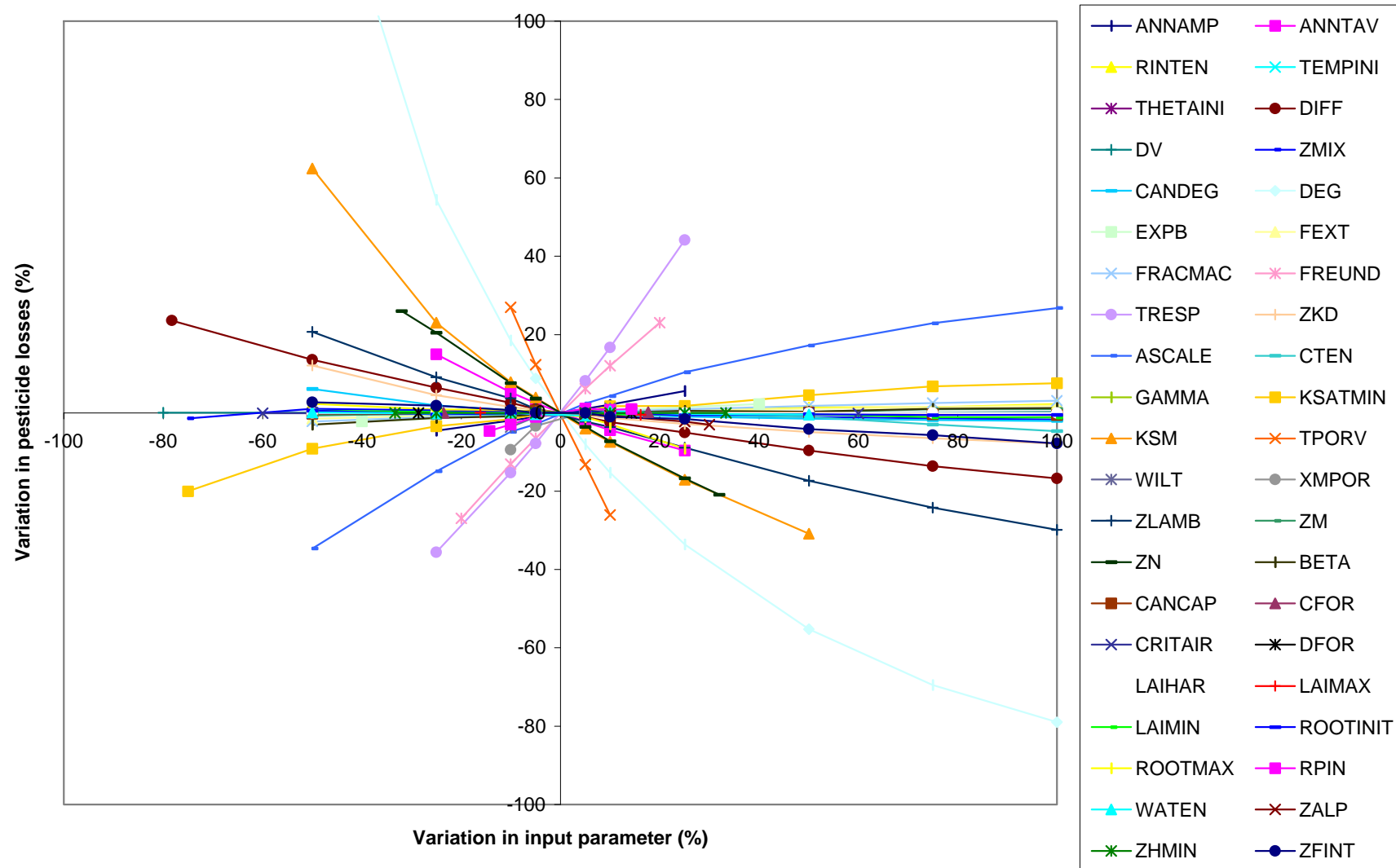
Influence of the variation of input parameters on percolation predicted by MACRO
Pesticide T on Hodnet scenario



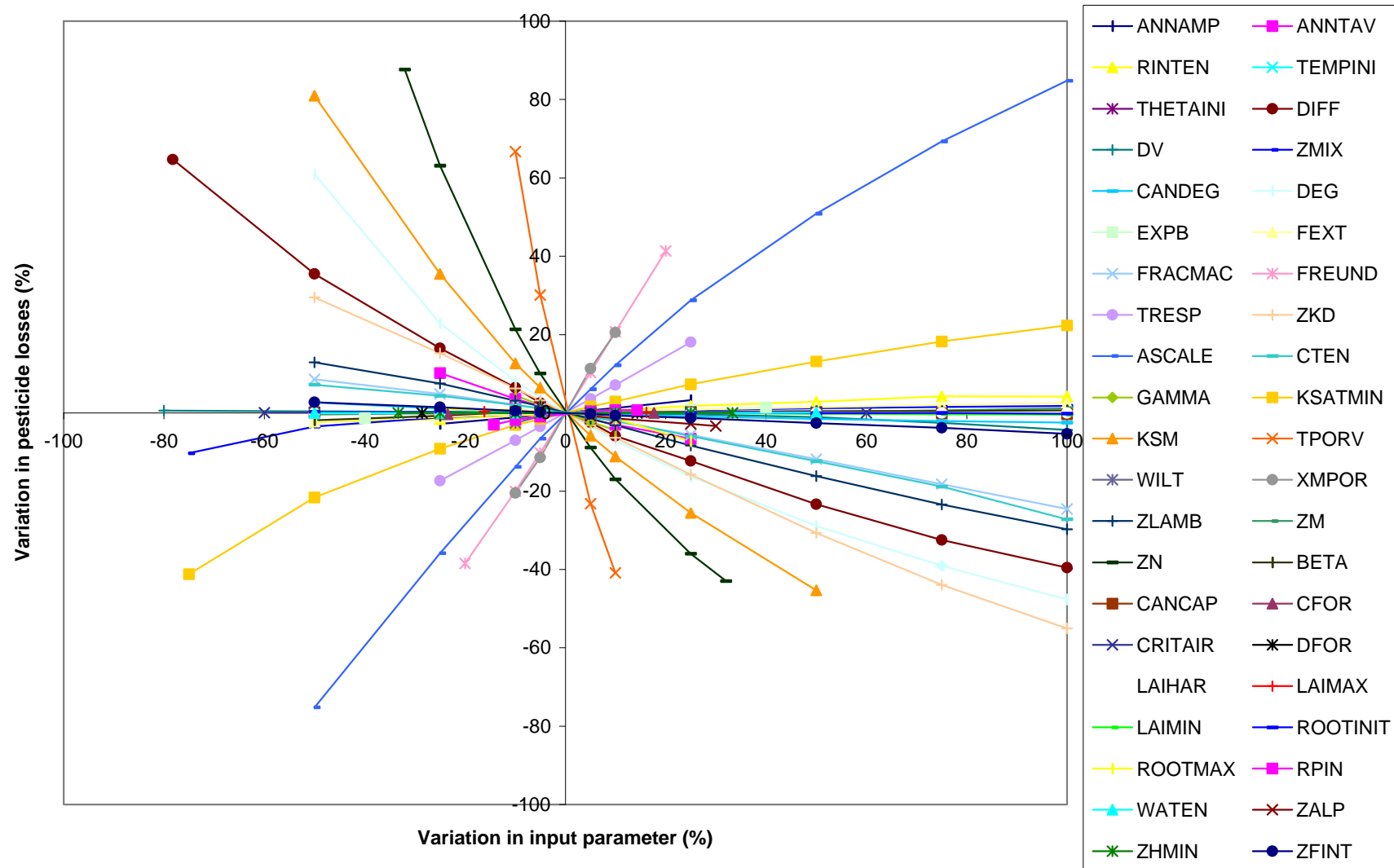
Influence of the variation of input parameters on pesticide losses predicted by MACRO
Pesticide L on Wick scenario



Influence of the variation of input parameters on pesticide losses predicted by MACRO
Pesticide T on Wick scenario



Influence of the variation of input parameters on pesticide losses predicted by MACRO
Pesticide L on Hodnet scenario








Influence of the variation of input parameters on pesticide losses predicted by MACRO
Pesticide T on Hodnet scenario

		Wick		Hodnet		Influence
		Pesticide L	Pesticide T	Pesticide L	Pesticide T	
XMPOR	Boundary soil water content	0.728 -	0.728 -	0.856 -	0.856 -	-
RPIN	Root distribution	0.274 +	0.274 +	0.371 +	0.371 +	+
THETAINI	Initial soil moisture	0.181 +	0.181 +	0.320 +	0.320 +	+
ROOTMAX	Max root depth	0.226 -	0.226 -	0.280 -	0.280 -	-
WILT	Wilting point	0.153 +	0.153 +	0.300 +	0.300 +	+
TPORV	Saturated water content	0.034 -	0.034 -	0.236 -	0.236 -	-
ZALP	Correction factor for wet canopy evaporation	0.122 -	0.122 -	0.133 -	0.133 -	-
CTEN	Boundary soil water tension	0.113 -	0.113 -	0.095 -	0.095 -	-
ZLAMB	Pore size distribution index	0.114 +	0.114 +	0.054 +/-	0.054 +/-	+/-
BETA	Root adaptability factor	0.033 +	0.033 +	0.054 +	0.054 +	+
ZN	Pore size distribution factor macrop.	0.014 -	0.014 -	0.049 -	0.049 -	-
GAMMA	Bulk density	0.012 -	0.012 -	0.021 -	0.021 -	+/-
KSM	Boundary hydraulic conductivity	0.042 +	0.042 +	0.005 +/-	0.005 +/-	+/-
LAIMAX	Max Leaf Area Index	0.011 -	0.011 -	0.018 -	0.018 -	-
KSATMIN	Saturated hydraulic conductivity	0.004 +	0.004 +	0.015 +	0.015 +	+
WATEN	Critical water tension for root water uptake	0.013 -	0.013 -	0.005 -	0.005 -	-
RINTEN	Rainfall intensity	0.009 +	0.009 +	0.007 +	0.007 +	+
ZM	Tortuosity factor micropores	0.008 +	0.008 +	0.005 +	0.005 +	+
CFORM	Form factor	0.002 +	0.002 +	0.004 +	0.004 +	+
ROOTINIT	Root Depth at zdatemin	0.003 -	0.003 -	0.003 -	0.003 -	-
CANCAP	Canopy Interception Capacity	0.003 -	0.003 -	0.002 -	0.002 -	-
ASCALE	Effective diffusion pathlength	0.002 -	0.002 -	0.002 -	0.002 -	-
LAIMIN	Leaf Area Index at zdatemin	0.001 -	0.001 -	0.002 -	0.002 -	-
CRITAIR	Critical soil air content for root water uptake	0	0	0.001 +	0.001 +	+
ZFINT	Fraction of irrigation intercepted by canopy	0	0	0	0	
ANNAMP	Temp annual amplitude	0	0	0	0	
ANNTAV	Average annual temp	0	0	0	0	
TEMPINI	Initial soil temp	0	0	0	0	
DIFF	Diffusion coefficient in water	0	0	0	0	
DV	Dispersivity	0	0	0	0	
ZMIX	Mixing depth	0	0	0	0	
CANDEG	Canopy degradation rate	0	0	0	0	
DEG	Degradation rates	0	0	0	0	
EXPB	Exponent moisture relation	0	0	0	0	
FEXT	Canopy wash-off coefficient	0	0	0	0	
FRACMAC	Fraction sorption sites macropores	0	0	0	0	
FREUND	Freundlich exponent	0	0	0	0	
TRESP	Exponent Temp response	0	0	0	0	
ZKD	Sorption coefficient	0	0	0	0	
DFORM	Form factor	0	0	0	0	
LAIHAR	Leaf Area Index at harvest	0	0	0	0	
ZHMIN	Crop height at zdatemin	0	0	0	0	

**Classification of MACRO parameters according to their influence on percolation
(values presented are MAROV)**

A positive influence means that an increase in the value of the parameter will result in an increase in percolation and vice versa

The shades of grey represent a classification of parameters into sensitivity classes as follows:






	Extremely sensitive		Slightly sensitive
	Very sensitive		Insensitive
	Moderately sensitive		

		Wick		Hodnet		Influence
		Pesticide L	Pesticide T	Pesticide L	Pesticide T	
FREUND	Freundlich exponent	4.552 +	22.21 +	1.348 +	2.070 +	+
DEG	Degradation rates	8.157 -	11.94 -	3.097 -	1.218 -	-
ZKD	Sorption coefficient	4.496 -	12.13 -	0.242 -	0.633 -	-
TPORV	Saturated water content	0.524 -	5.895 -	2.696 -	6.675 -	-
KSM	Boundary hydraulic conductivity	0.389 +/-	7.000 -	1.247 -	1.619 -	+/-
TRESP	Exponent Temp response	3.488 +	3.369 +	1.765 +	0.722 +	+
ZN	Pore size distribution factor macrop.	0.131 -	5.615 -	0.818 -	2.739 -	-
XMPOR	Boundary soil water content	2.469 -	0.948 +	0.938 +	2.273 +	+/-
GAMMA	Bulk density	2.363 -	3.680 -	0.067 -	0.448 -	-
ANNTAV	Average annual temp	1.823 -	2.231 -	0.597 -	0.406 -	-
ASCALE	Effective diffusion pathlength	0.247 -	0.873 +	0.692 +	1.504 +	+/-
ZLAMB	Pore size distribution index	0.829 +	1.450 -	0.456 -	0.341 -	+/-
KSATMIN	Saturated hydraulic conductivity	0.147 +/-	0.631 +	0.267 +	0.549 +	+/-
EXPB	Exponent moisture relation	0.507 +	0.855 +	0.056 +	0.034 +/-	+/-
RINTEN	Rainfall intensity	0.232 -	0.950 +	0.091 +/-	0.124 +	+/-
CTEN	Boundary soil water tension	0.085 +/-	0.868 -	0.069 +/-	0.272 -	+/-
ANNAMP	Temp annual amplitude	0.568 +	0.362 +	0.222 +	0.128 +	+
DIFF	Diffusion coefficient in water	0.019 +	0.067 -	0.302 -	0.826 -	+/-
ROOTMAX	Max root depth	0.188 +/-	0.336 +	0.366 -	0.290 -	+/-
RPIN	Root distribution	0.157 -	0.414 -	0.322 +	0.211 +	+/-
WILT	Wilting point	0.125 -	0.248 -	0.363 +	0.255 +	+/-
ZALP	Correction factor for wet canopy evaporation	0.276 -	0.293 -	0.101 -	0.146 -	-
FRACMAC	Fraction sorption sites macropores	0.023 +	0.481 -	0.043 +	0.245 -	+/-
ZFINT	Fraction of irrigation intercepted by canopy	0.193 -	0.165 -	0.104 -	0.067 -	-
ZMIX	Mixing depth	0.082 +	0.218 +	0.026 +/-	0.137 +	+/-
CANCAP	Canopy Interception Capacity	0.183 +/-	0.126 +/-	0.126 +/-	0.029 +/-	+/-
WATEN	Critical water tension for root water uptake	0.132 +/-	0.080 +/-	0.136 +/-	0.065 +/-	+/-
BETA	Root adaptability factor	0.132 +/-	0.119 -	0.112 +	0.038 +/-	+/-
THETAINI	Initial soil moisture	0.085 +/-	0.141 +/-	0.152 +/-	0.012 +/-	+/-
ZM	Tortuosity factor micropores	0.113 +/-	0.112 +/-	0.065 +/-	0.023 +/-	+/-
CANDEG	Canopy deg rate	0.070 -	0.062 -	0.122 -	0.052 -	-
LAIMIN	Leaf Area Index at zdatemin	0.079 +/-	0.111 +/-	0.051 +/-	0.022 -	+/-
ROOTINIT	Root Depth at zdatemin	0.056 +/-	0.087 +/-	0.064 +/-	0.051 +/-	+/-
DV	Dispersivity	0.134 +	0.050 -	0.007 +/-	0.053 -	+/-
LAIMAX	Max Leaf Area Index	0.092 +/-	0.053 +/-	0.037 +/-	0.041 +/-	+/-
CFORM	Form factor	0.050 +/-	0.064 +/-	0.054 +/-	0.035 +/-	+/-
FEXT	Canopy wash-off coefficient	0.026 +	0.054 +	0.029 +	0.046 +	+
CRITAIR	Critical soil air for root water uptake	0	0	0.092 +/-	0.033 +/-	+/-
TEMPINI	Initial soil temp	0	0	0	0	
DFORM	Form factor	0	0	0	0	
LAIHAR	Leaf Area Index at harvest	0	0	0	0	
ZHMIN	Crop height at zdatemin	0	0	0	0	

**Classification of MACRO parameters according to their influence on pesticide losses
(values presented are MAROV)**

A positive influence means that an increase in the value of the parameter will result in an increase in pesticide losses and vice versa

The shades of grey represent a classification of parameters into sensitivity classes as follows:

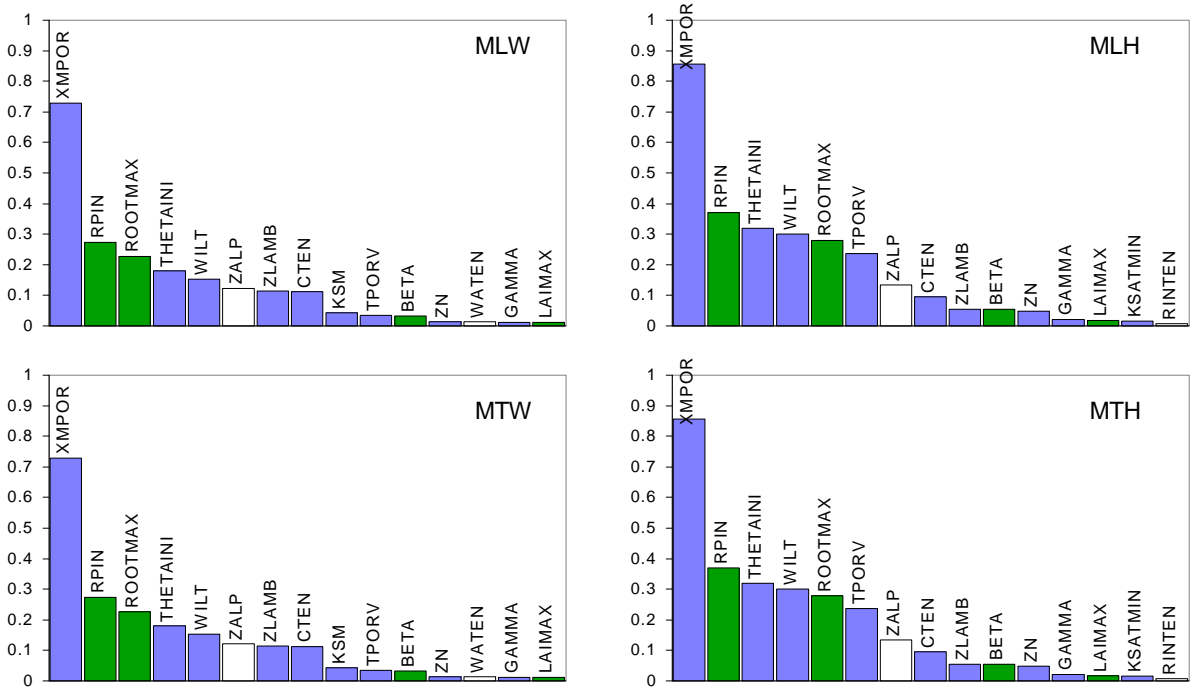
	Extremely sensitive		Slightly sensitive
	Very sensitive		Insensitive
	Moderately sensitive		

	MLW		MTW		MLH		MTH	
1	XMPOR	0.728	XMPOR	0.728	XMPOR	0.856	XMPOR	0.856
2	RPIN	0.274	RPIN	0.274	RPIN	0.371	RPIN	0.371
3	ROOTMAX	0.226	ROOTMAX	0.226	THETAINI	0.320	THETAINI	0.320
4	THETAINI	0.181	THETAINI	0.181	WILT	0.300	WILT	0.300
5	WILT	0.153	WILT	0.153	ROOTMAX	0.280	ROOTMAX	0.280
6	ZALP	0.122	ZALP	0.122	TPORV	0.236	TPORV	0.236
7	ZLAMB	0.114	ZLAMB	0.114	ZALP	0.133	ZALP	0.133
8	CTEN	0.113	CTEN	0.113	CTEN	0.095	CTEN	0.095
9	KSM	0.042	KSM	0.042	ZLAMB	0.054	ZLAMB	0.054
10	TPORV	0.034	TPORV	0.034	BETA	0.054	BETA	0.054
11	BETA	0.033	BETA	0.033	ZN	0.049	ZN	0.049
12	ZN	0.014	ZN	0.014	GAMMA	0.021	GAMMA	0.021
13	WATEN	0.013	WATEN	0.013	LAIMAX	0.018	LAIMAX	0.018
14	GAMMA	0.012	GAMMA	0.012	KSATMIN	0.015	KSATMIN	0.015
15	LAIMAX	0.011	LAIMAX	0.011	RINTEN	0.007	RINTEN	0.007

**The 15 most influential parameters on the prediction of percolation
by MACRO for the four scenarios (classification by MAROV values).**

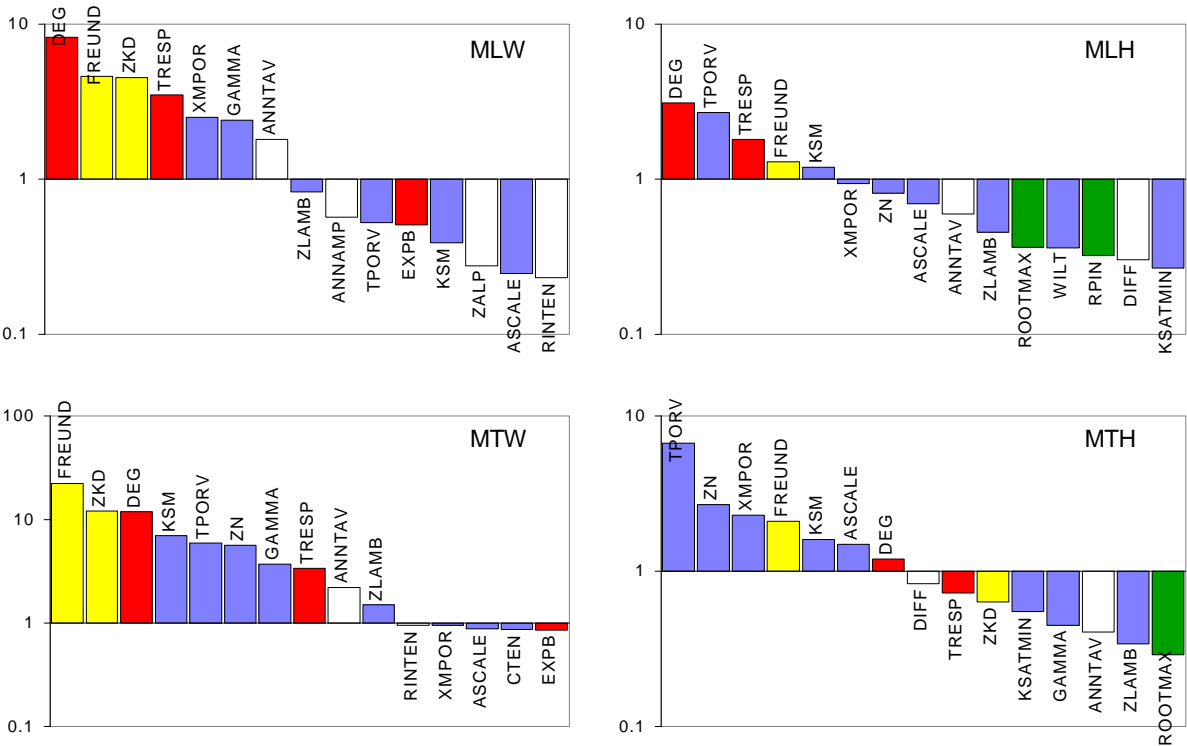
	MLW		MTW		MLH		MTH	
1	DEG	8.2	FREUND	22.2	DEG	3.1	TPORV	6.7
2	FREUND	4.6	ZKD	12.1	TPORV	2.7	ZN	2.7
3	ZKD	4.5	DEG	11.9	TRESP	1.8	XMPOR	2.3
4	TRESP	3.5	KSM	7.0	FREUND	1.3	FREUND	2.1
5	XMPOR	2.5	TPORV	5.9	KSM	1.2	KSM	1.6
6	GAMMA	2.4	ZN	5.6	XMPOR	0.938	ASCALE	1.5
7	ANNTAV	1.8	GAMMA	3.7	ZN	0.818	DEG	1.2
8	ZLAMB	0.829	TRESP	3.4	ASCALE	0.692	DIFF	0.826
9	ANNAMP	0.568	ANNTAV	2.2	ANNTAV	0.597	TRESP	0.722
10	TPORV	0.524	ZLAMB	1.5	ZLAMB	0.456	ZKD	0.633
11	EXPB	0.507	RINTEN	0.950	ROOTMAX	0.366	KSATMIN	0.549
12	KSM	0.389	XMPOR	0.948	WILT	0.363	GAMMA	0.448
13	ZALP	0.276	ASCALE	0.873	RPIN	0.322	ANNTAV	0.406
14	ASCALE	0.247	CTEN	0.868	DIFF	0.302	ZLAMB	0.341
15	RINTEN	0.232	EXPB	0.855	KSATMIN	0.267	ROOTMAX	0.290

**The 15 most influential parameters on the prediction of pesticide losses
by MACRO for the four scenarios (classification by MAROV values).**



Sensitivity of percolation predicted by MACRO
The 15 most influential parameters have been classified into as follows





Sensitivity of pesticide losses predicted by MACRO
The 15 most influential parameters have been classified into categories as follows



One-at-a-time sensitivity analysis for PELMO (version 3.00)

Abbreviation	Parameter description
AMXD	Maximum active rooting depth
ANET	Depth of evapotranspiration computation
ASM	Soil moisture during degradation
BUD	Bulk density
CINT	Maximum interception storage
COVM	Maximum soil cover
DEGR	Degradation rate
FEXT	Foliar extraction coefficient
HENR	Henry's constant
KF	Freundlich sorption coefficient
MEXP	Exponent for moisture correction
NF	Freundlich exponent
PDRA	Plant decay rate
QTEN	Increase given a temperature increase of 10°C
UPTK	Plant uptake efficiency factor
WC-FC	Water capacity – Field capacity
WP	Wilting point

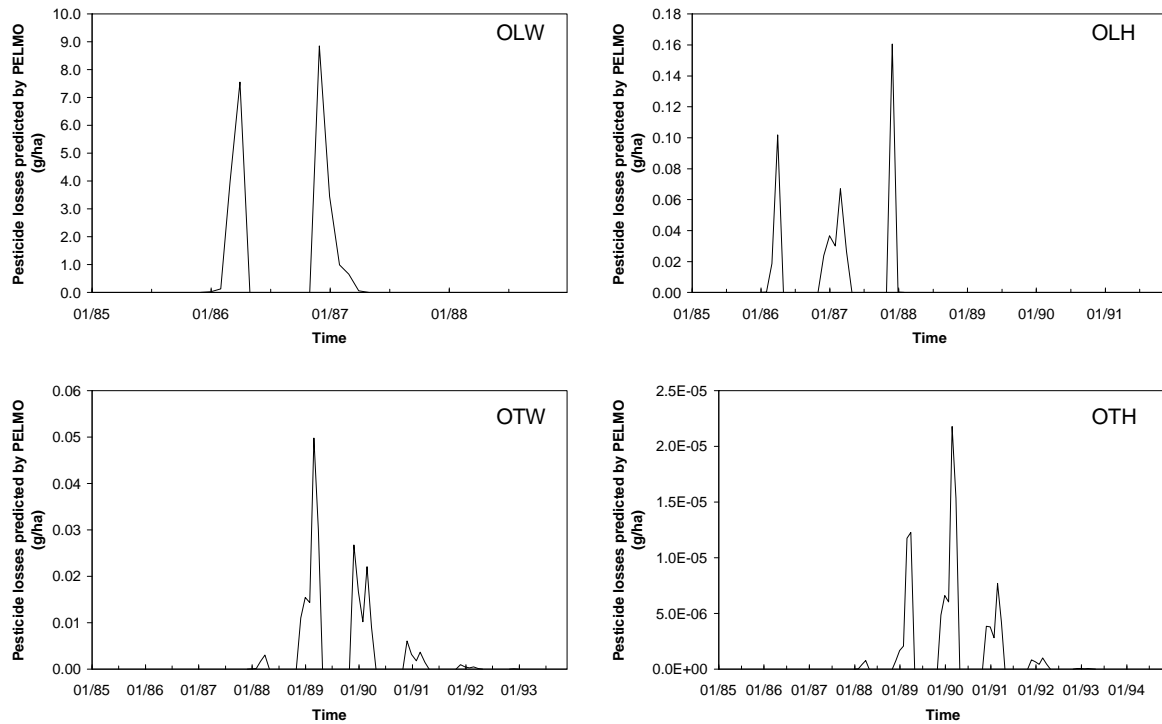
List of PELMO parameters included in the sensitivity analyses

	Recharge (mm)				Pesticide losses at 1-m depth (g/ha)			
	OLW	OTW	OLH	OTH	OLW	OTW	OLH	OTH
1985	242	242	224	224	<0.01	<0.01	<0.01	<0.01
1986	241	241	223	223	20.6	<0.01	0.15	<0.01
1987	241	241	223	223	5.17	<0.01	0.16	<0.01
1988	241	241	223	223	<0.01	0.02	<0.01	<0.01
1989	-	241	223	223	-	0.14	<0.01	<0.01
1990	-	241	223	223	-	0.06	<0.01	<0.01
1991	-	241	223	223	-	0.01	<0.01	<0.01
1992	-	241	-	223	-	<0.01	-	<0.01
1993	-	241	-	223	-	<0.01	-	<0.01
1994	-	-	-	223	-	-	-	<0.01

Annual recharge and pesticide losses predicted by PELMO for the four scenarios

	OLW	OTW	OLH	OTH
Number of years	4	9	7	10
Total recharge (mm)	963	2166	1565	2235
Total pesticide losses at 1-m depth (g/ha)	25.7	0.23	0.31	1.11×10^{-7}
Total pesticide losses at 1-m depth (% applied)	1.29	0.01	0.02	5.53×10^{-6}

Accumulated recharge and pesticide losses predicted by PELMO for the four scenarios



Monthly pesticide losses predicted by PELMO for the four scenarios (g/ha)

Variation of parameters (OLW)

Variations were attributed through the yellow cells

Nominal values		Variation range					
		Lower val.	Upper val.	Percentage of variation	Percentage of variation	Multiplication factor	Multiplication factor
Site parameters							
ANET	15	5	25	-66.67	66.67	0.33	1.67
CINT	0.15	0.1	0.3	-33.33	100.00	0.67	2.00
AMXD	60	30	100	-50.00	66.67	0.50	1.67
COVM	90	80	100	-11.11	11.11	0.89	1.11
UPTK	0.5	0	1	-100.00	100.00	0.00	2.00
BUD1	1.35	1.215	1.485	-10	10	0.90	1.10
BUD2	1.35	1.215	1.485	-10	10	0.90	1.10
BUD3	1.45	1.305	1.595	-10	10	0.90	1.10
BUD4	1.41	1.269	1.551	-10	10	0.90	1.10
BUD5	1.53	1.377	1.683	-10	10	0.90	1.10
WC1	0.2775	0.2081	0.3469	-25	25	0.75	1.25
WC2	0.2775	0.2081	0.3469	-25	25	0.75	1.25
WC3	0.1913	0.1435	0.2391	-25	25	0.75	1.25
WC4	0.1469	0.1102	0.1836	-25	25	0.75	1.25
WC5	0.1923	0.1442	0.2404	-25	25	0.75	1.25
WP1	0.1054	0.07905	0.13175	-25	25	0.75	1.25
WP2	0.1054	0.07905	0.13175	-25	25	0.75	1.25
WP3	0.0794	0.05955	0.09925	-25	25	0.75	1.25
WP4	0.0437	0.032775	0.054625	-25	25	0.75	1.25
WP5	0.0765	0.057375	0.095625	-25	25	0.75	1.25
PDRA	0.0893	0.04465	0.1786	-50.00	100.00	0.5	2
FEXT	0.1	0.05	0.15	-50.00	50.00	0.50	1.50
HENR	1.22E-03	1.22E-04	1.22E-02	-90	900	0.10	10.00
DEGR	0.0893	0.04465	0.1786	-50.00	100.00	0.5	2
QTEN	2.2	1.82	2.72	-17.27	23.64	0.83	1.24
ASM	27.75	19.70	34.6875	-29.01	25	0.71	1.25
MEXP	0.7	0.42	0.98	-40	40	0.60	1.40
KF1	0.34	0.17	0.68	-50.00	100.00	0.5	2
KF2	0.34	0.17	0.68	-50.00	100.00	0.5	2
KF3	0.16	0.08	0.32	-50.00	100.00	0.5	2
KF4	0.06	0.03	0.12	-50.00	100.00	0.5	2
KF5	0.04	0.02	0.08	-50.00	100.00	0.5	2
NF1	0.9	0.72	1.08	-20	20	0.80	1.20
NF2	0.9	0.72	1.08	-20	20	0.80	1.20
NF3	0.9	0.72	1.08	-20	20	0.80	1.20
NF4	0.9	0.72	1.08	-20	20	0.80	1.20
NF5	0.9	0.72	1.08	-20	20	0.80	1.20

Variation attributed to PELMO input parameters
Pesticide L on Wick scenario

Variation of parameters (OTW)

Variations were attributed through the yellow cells

Nominal values		Variation range					
		Lower val.	Upper val.	Percentage of variation	Percentage of variation	Multiplication factor	Multiplication factor
ANET	15	5	25	-66.67	66.67	0.33	1.67
CINT	0.15	0.1	0.3	-33.33	100.00	0.67	2.00
AMXD	60	30	100	-50.00	66.67	0.50	1.67
COVM	90	80	100	-11.11	11.11	0.89	1.11
UPTK	0.5	0	1	-100.00	100.00	0.00	2.00
BUD1	1.35	1.215	1.485	-10	10	0.90	1.10
BUD2	1.35	1.215	1.485	-10	10	0.90	1.10
BUD3	1.45	1.305	1.595	-10	10	0.90	1.10
BUD4	1.41	1.269	1.551	-10	10	0.90	1.10
BUD5	1.53	1.377	1.683	-10	10	0.90	1.10
WC1	0.2775	0.2081	0.3469	-25	25	0.75	1.25
WC2	0.2775	0.2081	0.3469	-25	25	0.75	1.25
WC3	0.1913	0.1435	0.2391	-25	25	0.75	1.25
WC4	0.1469	0.1102	0.1836	-25	25	0.75	1.25
WC5	0.1923	0.1442	0.2404	-25	25	0.75	1.25
WP1	0.1054	0.07905	0.13175	-25	25	0.75	1.25
WP2	0.1054	0.07905	0.13175	-25	25	0.75	1.25
WP3	0.0794	0.05955	0.09925	-25	25	0.75	1.25
WP4	0.0437	0.032775	0.054625	-25	25	0.75	1.25
WP5	0.0765	0.057375	0.095625	-25	25	0.75	1.25
PDRA	0.0298	0.0149	0.0596	-50.00	100.00	0.5	2
FEXT	0.1	0.05	0.15	-50.00	50.00	0.50	1.50
HENR	1.00E-10	1.00E-11	1.00E-09	-90	900	0.10	10.00
DEGR	0.0298	0.0149	0.0596	-50.00	100.00	0.5	2
QTEN	2.2	1.82	2.72	-17.27	23.64	0.83	1.24
ASM	27.75	19.70	34.6875	-29.01	25	0.71	1.25
MEXP	0.7	0.42	0.98	-40	40	0.60	1.40
KF1	1.7	0.85	3.4	-50.00	100.00	0.5	2
KF2	1.7	0.85	3.4	-50.00	100.00	0.5	2
KF3	0.8	0.4	1.6	-50.00	100.00	0.5	2
KF4	0.3	0.15	0.6	-50.00	100.00	0.5	2
KF5	0.2	0.1	0.4	-50.00	100.00	0.5	2
NF1	0.9	0.72	1.08	-20	20	0.80	1.20
NF2	0.9	0.72	1.08	-20	20	0.80	1.20
NF3	0.9	0.72	1.08	-20	20	0.80	1.20
NF4	0.9	0.72	1.08	-20	20	0.80	1.20
NF5	0.9	0.72	1.08	-20	20	0.80	1.20

Variation attributed to PELMO input parameters
Pesticide T on Wick scenario

Variation of parameters (OLH)

Variations were attributed through the yellow cells

Nominal values		Variation range					
		Lower val.	Upper val.	Percentage of variation	Percentage of variation	Multiplication factor	Multiplication factor
ANET	15	5	25	-66.67	66.67	0.33	1.67
CINT	0.15	0.1	0.3	-33.33	100.00	0.67	2.00
AMXD	60	30	100	-50.00	66.67	0.50	1.67
COVM	90	80	100	-11.11	11.11	0.89	1.11
UPTK	0.5	0	1	-100.00	100.00	0.00	2.00
BUD1	1.39	1.251	1.529	-10	10	0.90	1.10
BUD2	1.39	1.251	1.529	-10	10	0.90	1.10
BUD3	1.62	1.458	1.782	-10	10	0.90	1.10
BUD4	1.55	1.395	1.705	-10	10	0.90	1.10
BUD5	1.48	1.332	1.628	-10	10	0.90	1.10
WC1	0.349	0.2618	0.4363	-25	25	0.75	1.25
WC2	0.349	0.2618	0.4363	-25	25	0.75	1.25
WC3	0.308	0.2310	0.3850	-25	25	0.75	1.25
WC4	0.322	0.2415	0.4025	-25	25	0.75	1.25
WC5	0.358	0.2685	0.4475	-25	25	0.75	1.25
WP1	0.168	0.126	0.21	-25	25	0.75	1.25
WP2	0.168	0.126	0.21	-25	25	0.75	1.25
WP3	0.179	0.13425	0.22375	-25	25	0.75	1.25
WP4	0.199	0.14925	0.24875	-25	25	0.75	1.25
WP5	0.201	0.15075	0.25125	-25	25	0.75	1.25
PDRA	0.0893	0.04465	0.1786	-50.00	100.00	0.5	2
FEXT	0.1	0.05	0.15	-50.00	50.00	0.50	1.50
HENR	1.22E-03	1.22E-04	1.22E-02	-90	900	0.10	10.00
DEGR	0.0893	0.04465	0.1786	-50.00	100.00	0.5	2
QTEN	2.2	1.82	2.72	-17.27	23.64	0.83	1.24
ASM	34.9	31.20	43.6250	-10.60	25	0.89	1.25
MEXP	0.7	0.42	0.98	-40	40	0.60	1.40
KF1	0.23	0.115	0.46	-50.00	100.00	0.5	2
KF2	0.23	0.115	0.46	-50.00	100.00	0.5	2
KF3	0.096	0.048	0.192	-50.00	100.00	0.5	2
KF4	0.08	0.04	0.16	-50.00	100.00	0.5	2
KF5	0.06	0.03	0.12	-50.00	100.00	0.5	2
NF1	0.9	0.72	1.08	-20	20	0.80	1.20
NF2	0.9	0.72	1.08	-20	20	0.80	1.20
NF3	0.9	0.72	1.08	-20	20	0.80	1.20
NF4	0.9	0.72	1.08	-20	20	0.80	1.20
NF5	0.9	0.72	1.08	-20	20	0.80	1.20

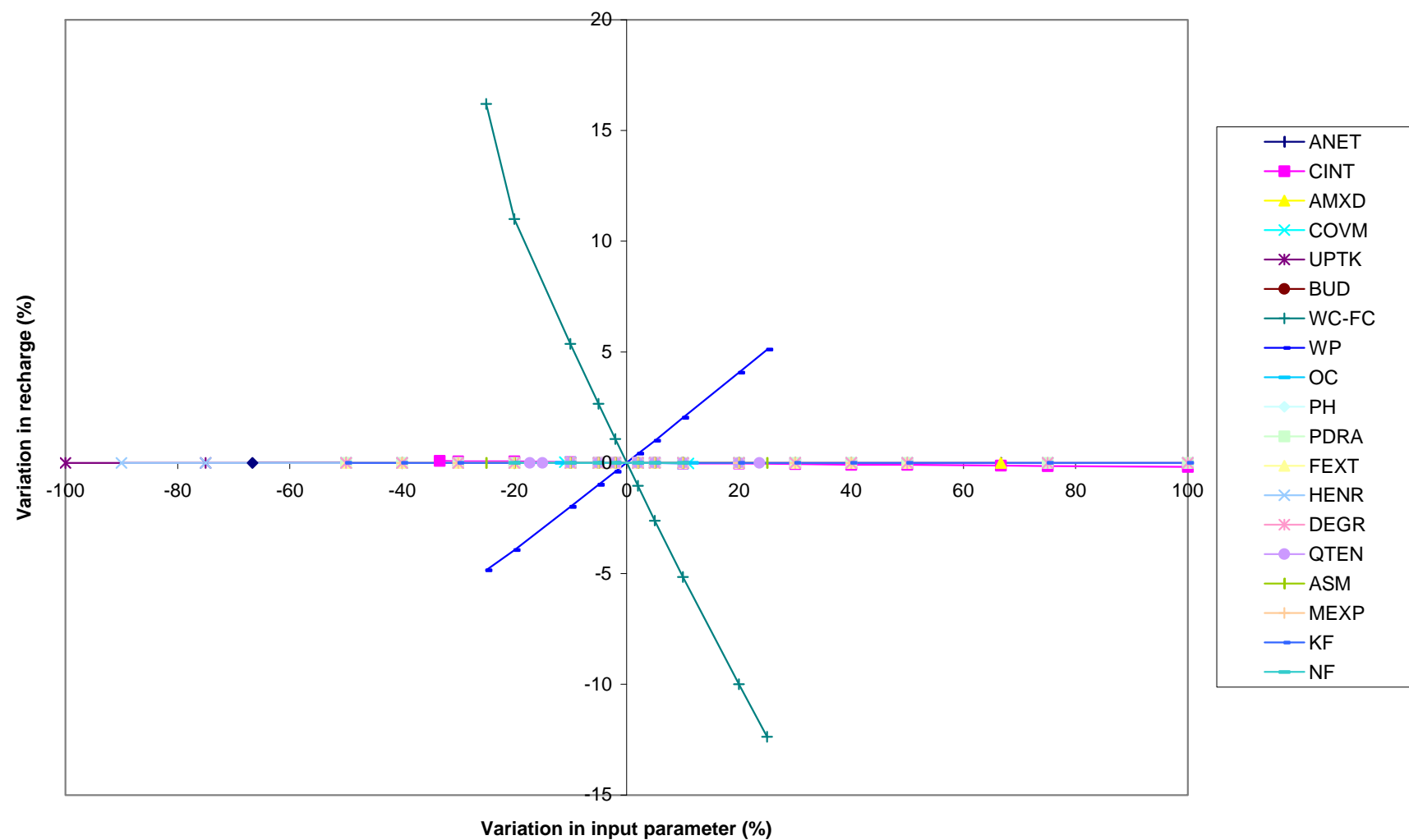
Variation attributed to PELMO input parameters
Pesticide L on Hodnet scenario

Variation of parameters (OTH)

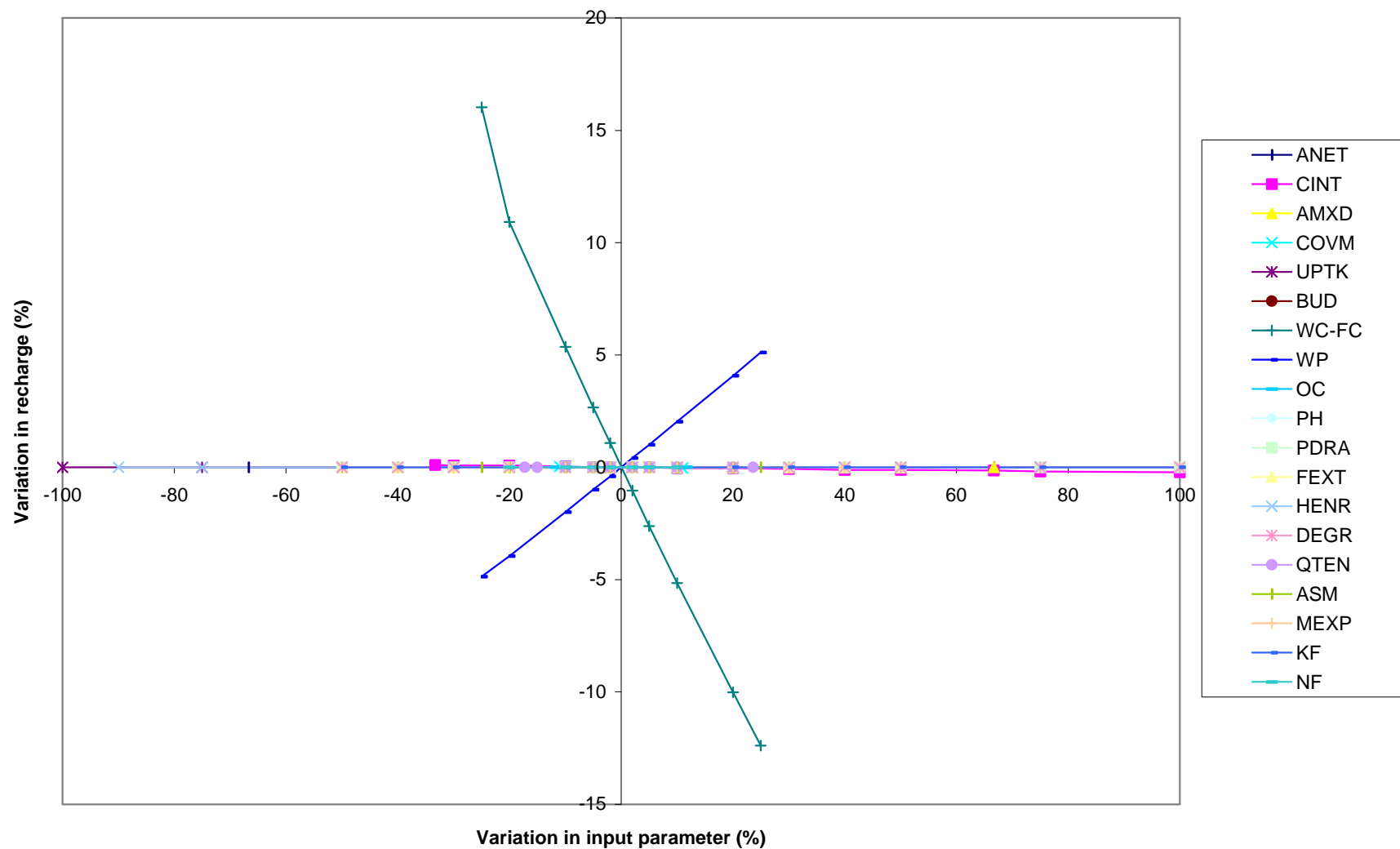
Variations were attributed through the yellow cells

Nominal values		Variation range					
		Lower val.	Upper val.	Percentage of variation	Percentage of variation	Multiplication factor	Multiplication factor
ANET	15	5	25	-66.67	66.67	0.33	1.67
CINT	0.15	0.1	0.3	-33.33	100.00	0.67	2.00
AMXD	60	30	100	-50.00	66.67	0.50	1.67
COVM	90	80	100	-11.11	11.11	0.89	1.11
UPTK	0.5	0	1	-100.00	100.00	0.00	2.00
BUD1	1.39	1.251	1.529	-10	10	0.90	1.10
BUD2	1.39	1.251	1.529	-10	10	0.90	1.10
BUD3	1.62	1.458	1.782	-10	10	0.90	1.10
BUD4	1.55	1.395	1.705	-10	10	0.90	1.10
BUD5	1.48	1.332	1.628	-10	10	0.90	1.10
WC1	0.349	0.2618	0.4363	-25	25	0.75	1.25
WC2	0.349	0.2618	0.4363	-25	25	0.75	1.25
WC3	0.308	0.2310	0.3850	-25	25	0.75	1.25
WC4	0.322	0.2415	0.4025	-25	25	0.75	1.25
WC5	0.358	0.2685	0.4475	-25	25	0.75	1.25
WP1	0.168	0.126	0.21	-25	25	0.75	1.25
WP2	0.168	0.126	0.21	-25	25	0.75	1.25
WP3	0.179	0.13425	0.22375	-25	25	0.75	1.25
WP4	0.199	0.14925	0.24875	-25	25	0.75	1.25
WP5	0.201	0.15075	0.25125	-25	25	0.75	1.25
PDRA	0.0298	0.0149	0.0596	-50.00	100.00	0.5	2
FEXT	0.1	0.05	0.15	-50.00	50.00	0.50	1.50
HENR	1.00E-10	1.00E-11	1.00E-09	-90	900	0.10	10.00
DEGR	0.0298	0.0149	0.0596	-50.00	100.00	0.5	2
QTEN	2.2	1.82	2.72	-17.27	23.64	0.83	1.24
ASM	34.9	31.20	43.6250	-10.60	25	0.89	1.25
MEXP	0.7	0.42	0.98	-40	40	0.60	1.40
KF1	1.15	0.575	2.3	-50.00	100.00	0.5	2
KF2	1.15	0.575	2.3	-50.00	100.00	0.5	2
KF3	0.48	0.24	0.96	-50.00	100.00	0.5	2
KF4	0.4	0.2	0.8	-50.00	100.00	0.5	2
KF5	0.3	0.15	0.6	-50.00	100.00	0.5	2
NF1	0.9	0.72	1.08	-20	20	0.80	1.20
NF2	0.9	0.72	1.08	-20	20	0.80	1.20
NF3	0.9	0.72	1.08	-20	20	0.80	1.20
NF4	0.9	0.72	1.08	-20	20	0.80	1.20
NF5	0.9	0.72	1.08	-20	20	0.80	1.20

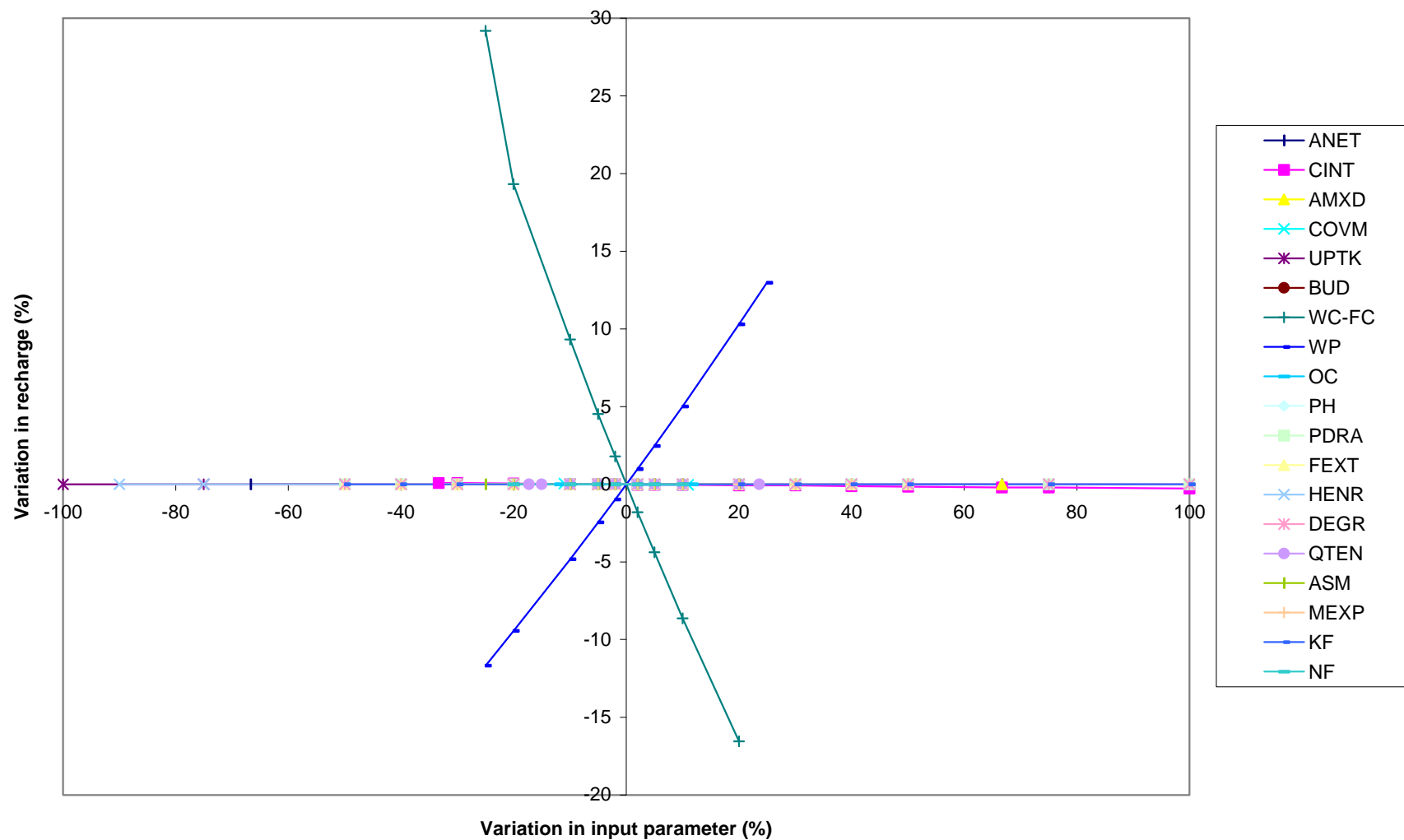
Variation attributed to PELMO input parameters
Pesticide T on Hodnet scenario



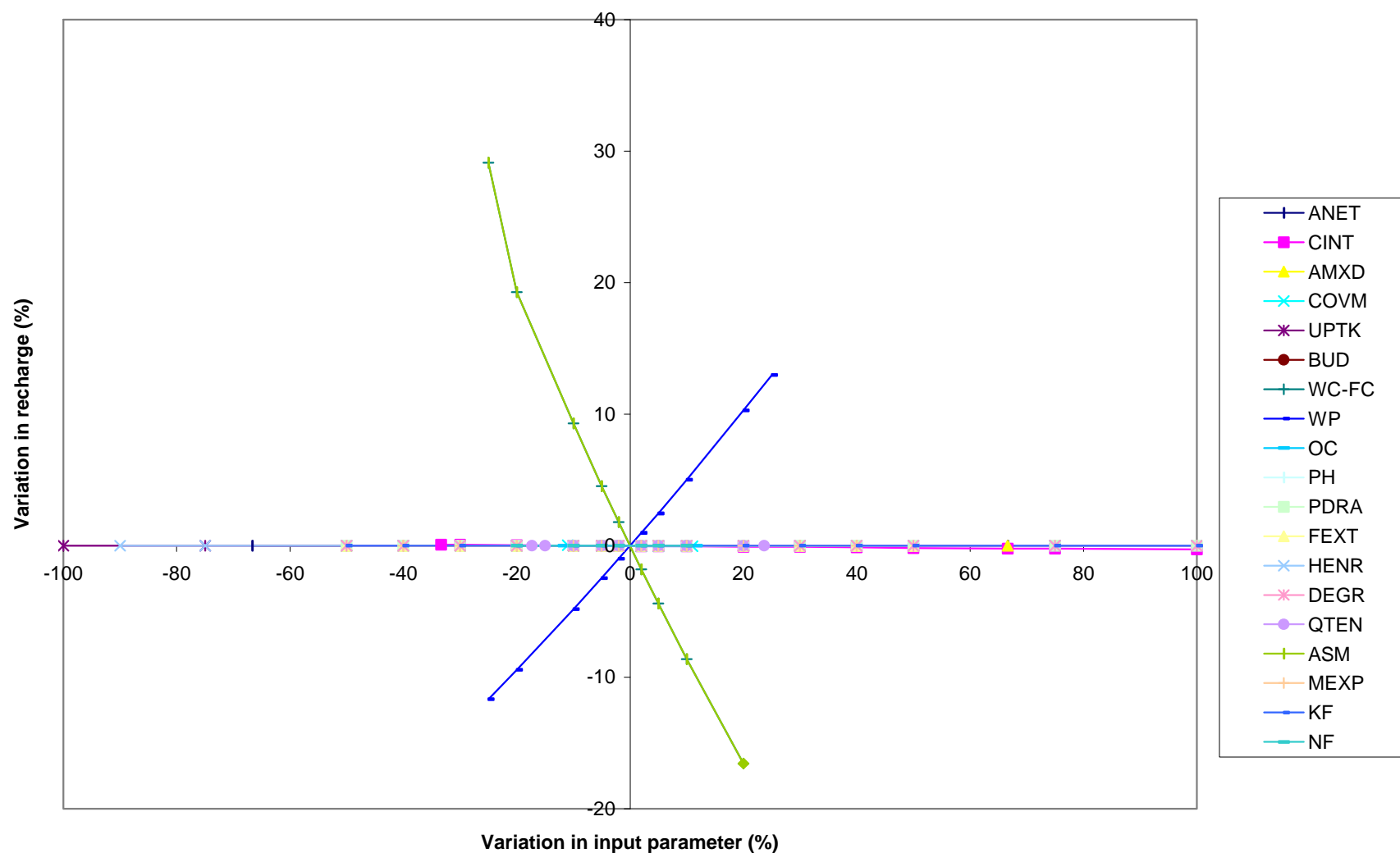
Influence of the variation of input parameters on recharge predicted by PELMO
Pesticide L on Wick scenario



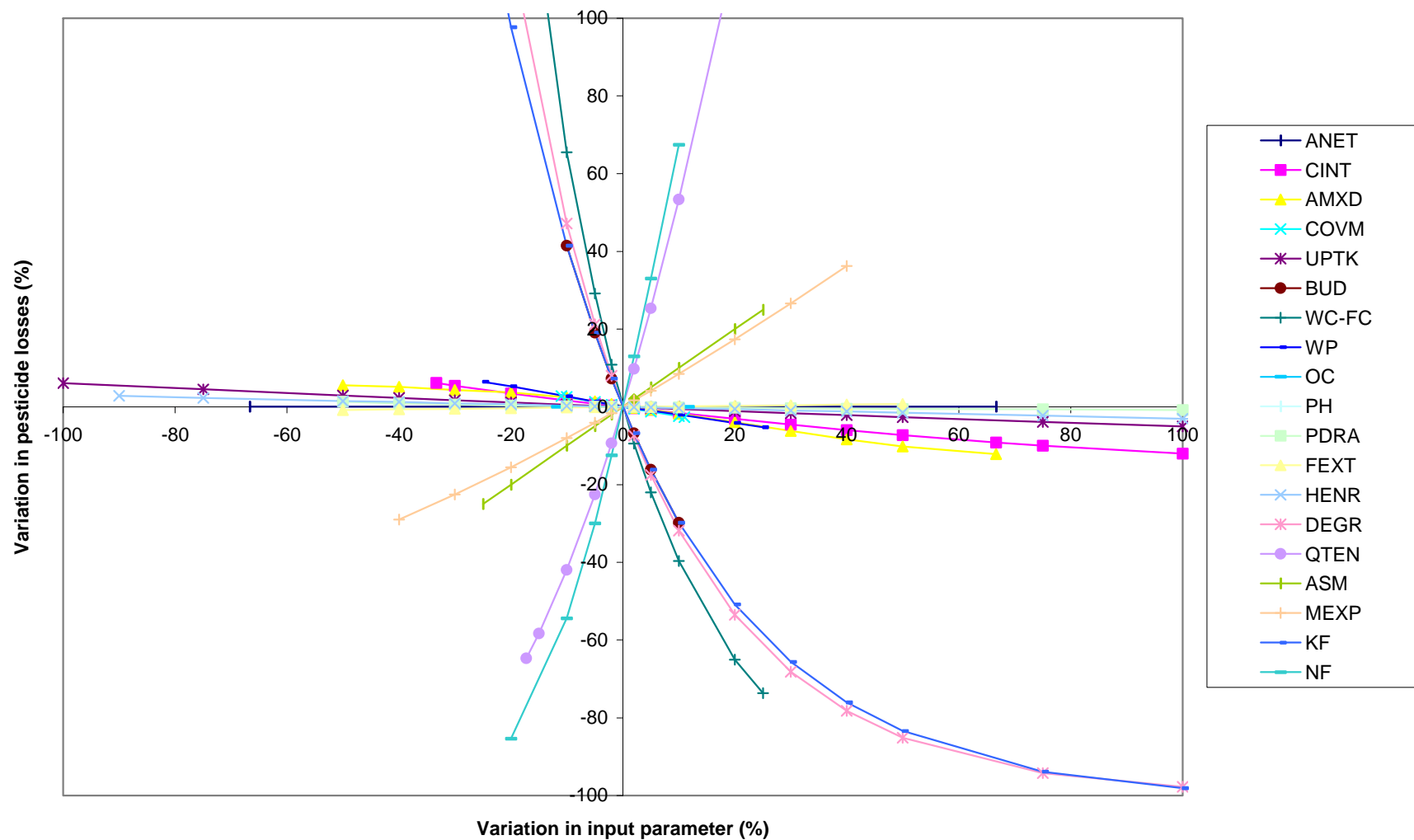
Influence of the variation of input parameters on recharge predicted by PELMO
Pesticide T on Wick scenario



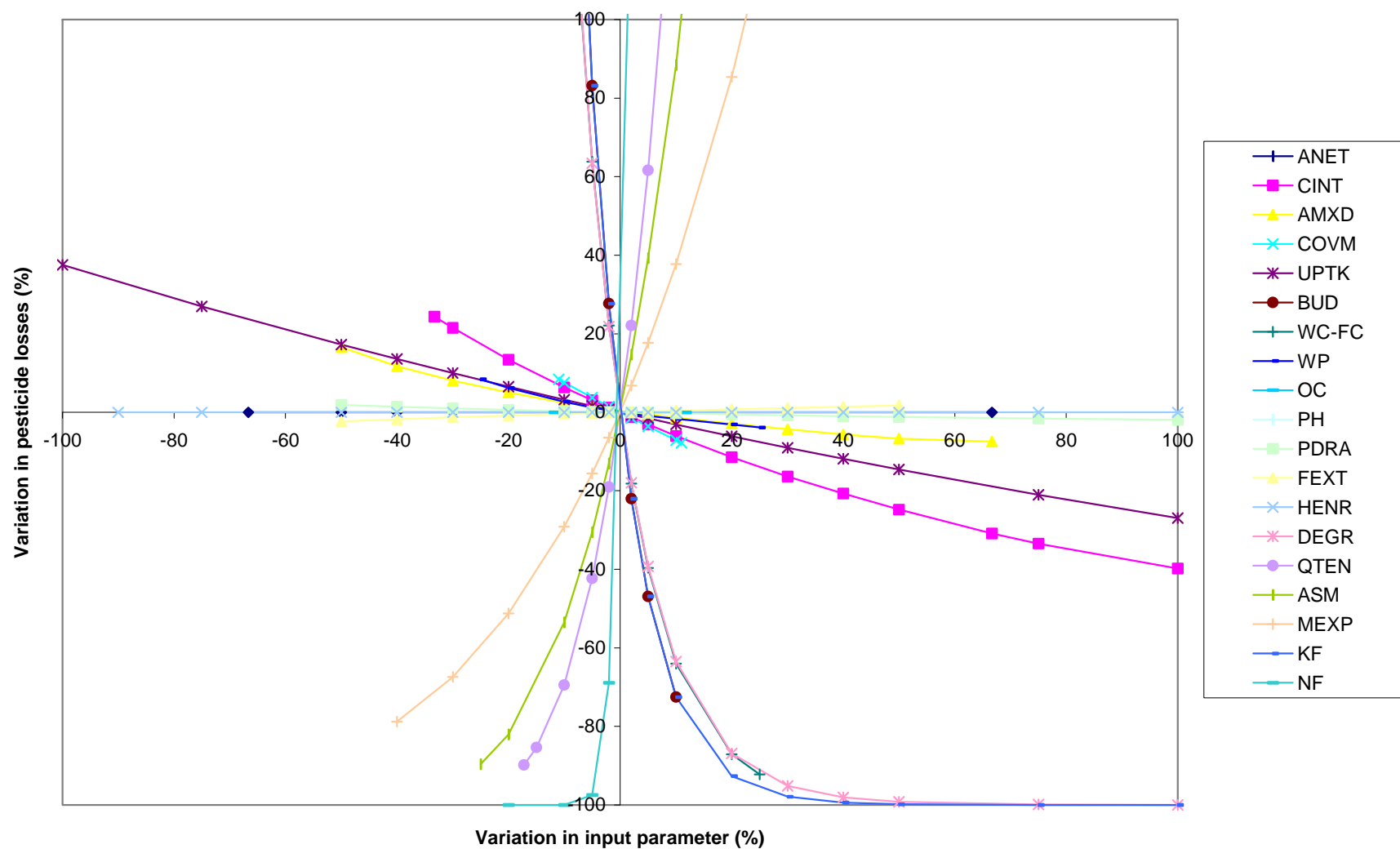
Influence of the variation of input parameters on recharge predicted by PELMO
Pesticide L on Hodnet scenario



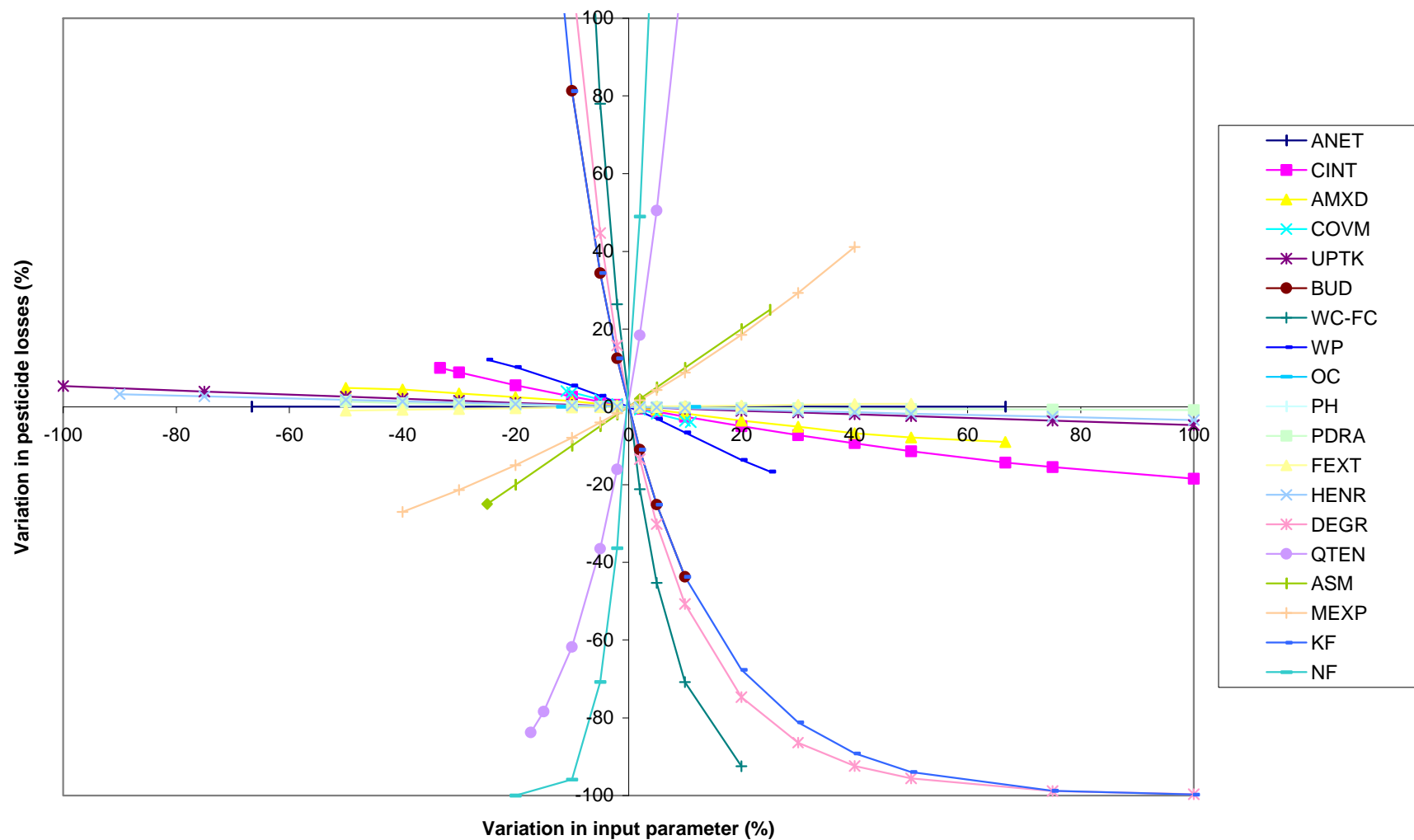
Influence of the variation of input parameters on recharge predicted by PELMO
Pesticide T on Hodnet scenario



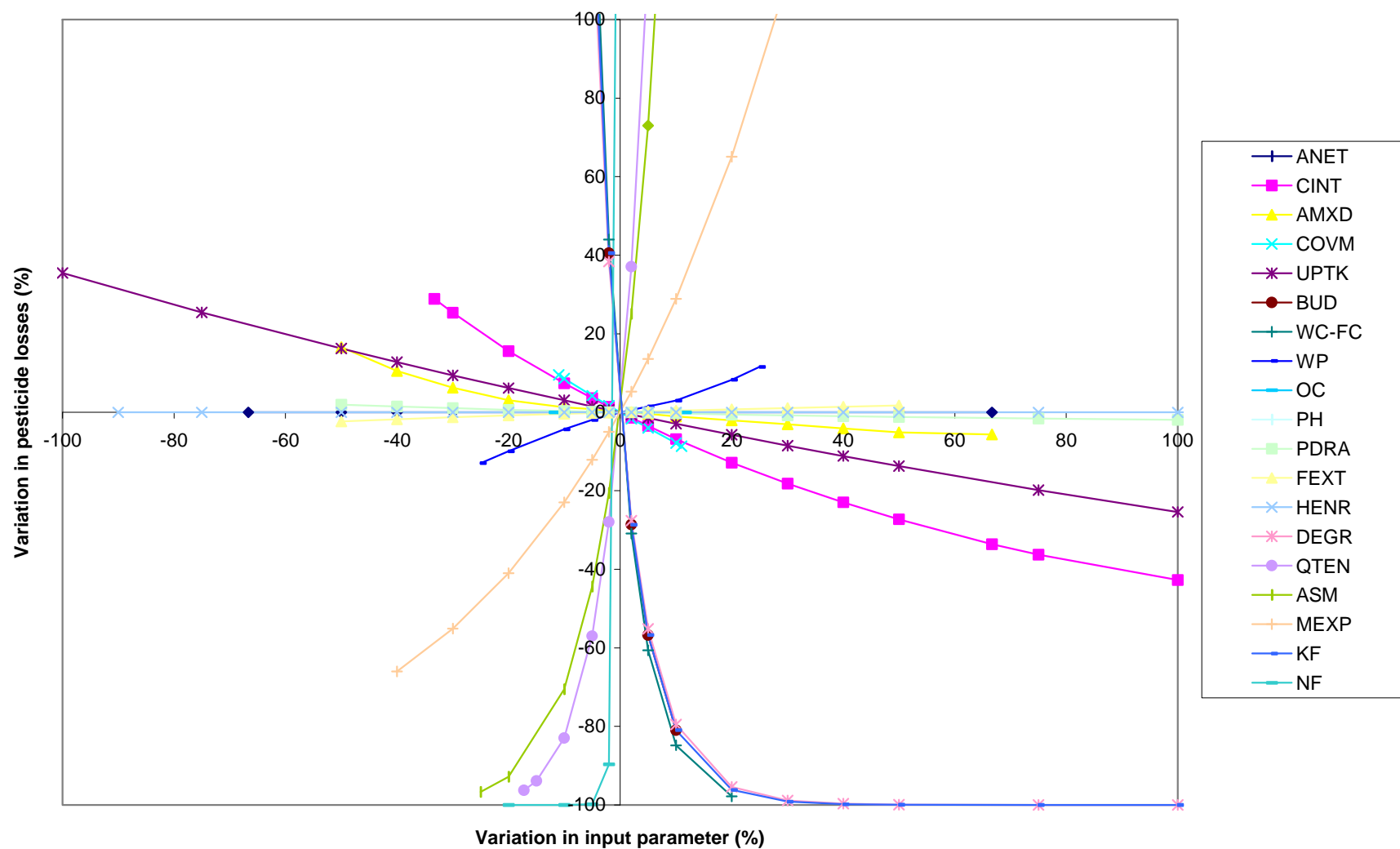
Influence of the variation of input parameters on pesticide losses predicted by PELMO
Pesticide L on Wick scenario



Influence of the variation of input parameters on pesticide losses predicted by PELMO
Pesticide T on Wick scenario



Influence of the variation of input parameters on pesticide losses predicted by PELMO
Pesticide L on Hodnet scenario








Influence of the variation of input parameters on pesticide losses predicted by PELMO
Pesticide T on Hodnet scenario

		Wick		Hodnet		Influence
		Pesticide L	Pesticide T	Pesticide L	Pesticide T	
WC-FC	Water capacity – Field capacity	0.648	0.641	1.167	1.165	-
WP	Wilting point	0.208	0.208	0.519	0.519	+
CINT	Maximum interception storage	0.003	0.004	0.019	0.020	-
COVM	Maximum soil cover	0.003	0.004	0.019	0.020	-
ANET	Depth of evapotranspiration computation	0	0	0	0	
AMXD	Maximum active rooting depth	0	0	0	0	
UPTK	Plant uptake efficiency factor	0	0	0	0	
BUD	Bulk density	0	0	0	0	
PDRA	Plant decay rate	0	0	0	0	
FEXT	Foliar extraction coefficient	0	0	0	0	
HENR	Henry's constant	0	0	0	0	
DEGR	Degradation rate	0	0	0	0	
QTEN	Increase given a temperature increase of 10°C	0	0	0	0	
ASM	Soil moisture during degradation	0	0	0	0	
MEXP	Exponent for moisture correction	0	0	0	0	
KF	Freundlich sorption coefficient	0	0	0	0	
NF	Freundlich exponent	0	0	0	0	

**Classification of PELMO parameters according to their influence on recharge
(values presented are MAROV)**

A positive influence means that an increase in the value of the parameter will result in an increase in recharge and vice versa

The shades of grey represent a classification of parameters into sensitivity classes as follows:






	Extremely sensitive		Slightly sensitive
	Very sensitive		Insensitive
	Moderately sensitive		

		Wick		Hodnet		Influence
		Pesticide L	Pesticide T	Pesticide L	Pesticide T	
DEGR	Degradation rate	12.345	197.923	110.485	16384.020	-
KF	Freundlich sorption coefficient	7.536	274.312	34.477	14425.139	-
NF	Freundlich exponent	6.746	167.301	36.750	6923.228	+
WC-FC	Water capacity – Field capacity	10.342	37.750	67.764	450.205	-
QTEN	Increase given a temperature increase of 10°C	5.983	22.288	17.262	94.061	+
BUD	Bulk density	4.147	23.175	8.129	46.539	-
ASM	Soil moisture during degradation	3.002	12.230	7.319	31.998	+
MEXP	Exponent for moisture correction	0.906	5.424	1.028	4.160	+
COVM	Maximum soil cover	0.255	0.762	0.376	0.864	-
CINT	Maximum interception storage	0.184	0.730	0.300	0.865	-
WP	Wilting point	0.288 (-)	0.335 (-)	0.683 (-)	0.517 (+)	-/+
AMXD	Maximum active rooting depth	0.375	0.343	0.197	0.331	-
UPTK	Plant uptake efficiency factor	0.061	0.375	0.059	0.355	-
FEXT	Foliar extraction coefficient	0.021	0.046	0.033	0.046	+
PDRA	Plant decay rate	0.026	0.038	0.033	0.039	-
HENR	Henry's constant	0.045	0	0.039	0	-
ANET	Depth of evapotranspiration computation	0	0	0	0	-

**Classification of PELMO parameters according to their influence on pesticide losses
(values presented are MAROV)**

A positive influence means that an increase in the value of the parameter will result in an increase in pesticide losses and vice versa

The shades of grey represent a classification of parameters into sensitivity classes as follows:

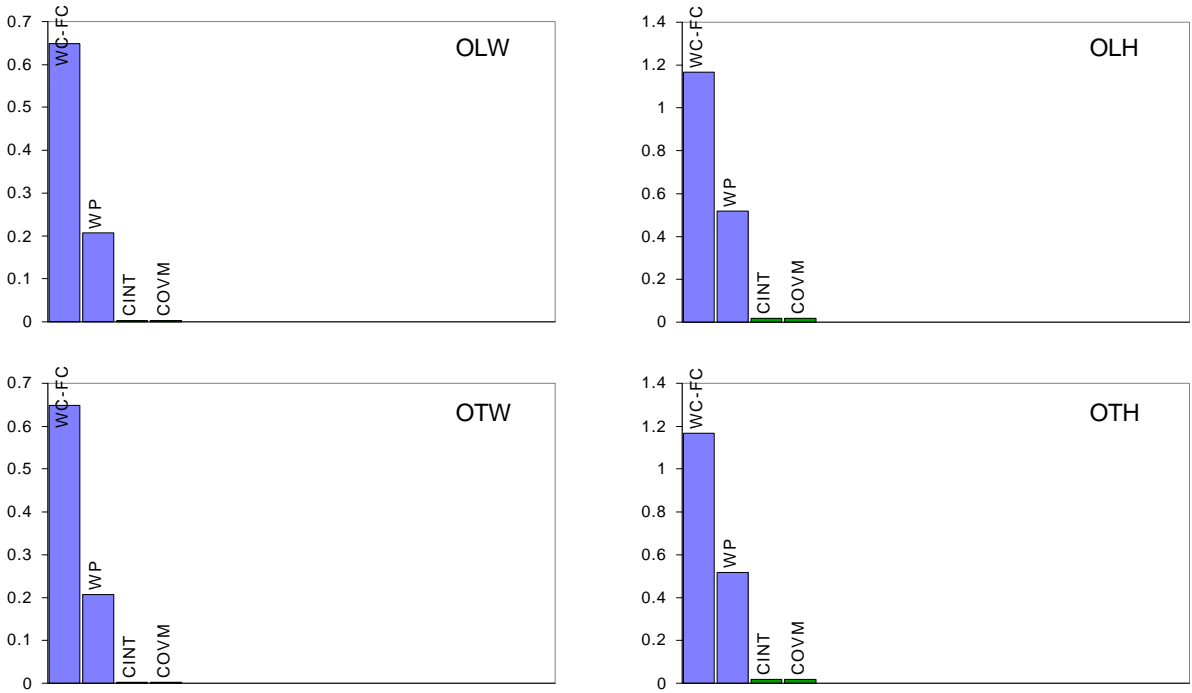
	Extremely sensitive		Slightly sensitive
	Very sensitive		Insensitive
	Moderately sensitive		

	OLW		OTW		OLH		OTH	
1	WC-FC	0.648	WC-FC	0.641	WC-FC	1.167	WC-FC	1.165
2	WP	0.208	WP	0.208	WP	0.519	WP	0.519
3	CINT	0.003	CINT	0.004	CINT	0.019	CINT	0.02
4	COVM	0.003	COVM	0.004	COVM	0.019	COVM	0.02
5	ANET	0	ANET	0	ANET	0	ANET	0
6	AMXD	0	AMXD	0	AMXD	0	AMXD	0
7	UPTK	0	UPTK	0	UPTK	0	UPTK	0
8	BUD	0	BUD	0	BUD	0	BUD	0
9	PDRA	0	PDRA	0	PDRA	0	PDRA	0
10	FEXT	0	FEXT	0	FEXT	0	FEXT	0
11	HENR	0	HENR	0	HENR	0	HENR	0
12	DEGR	0	DEGR	0	DEGR	0	DEGR	0
13	QTEN	0	QTEN	0	QTEN	0	QTEN	0
14	ASM	0	ASM	0	ASM	0	ASM	0
15	MEXP	0	MEXP	0	MEXP	0	MEXP	0

**The 15 most influential parameters on the prediction of recharge
by PELMO for the four scenarios (classification by MAROV values).**

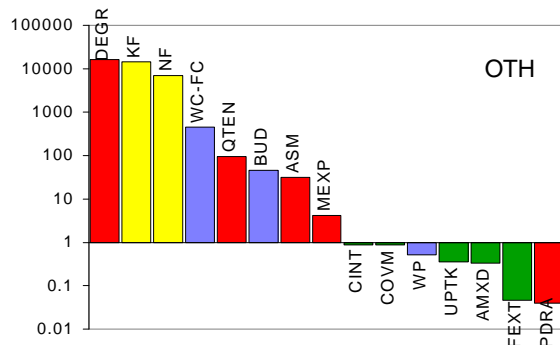
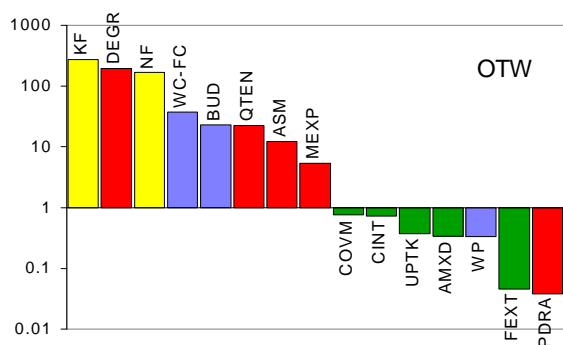
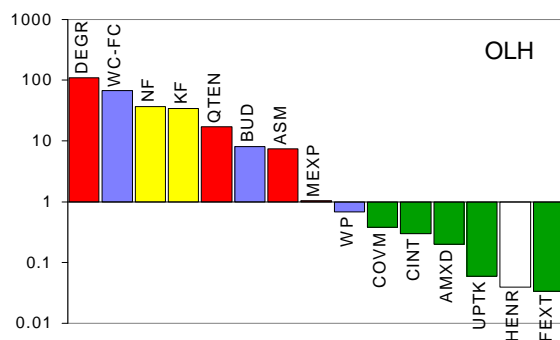
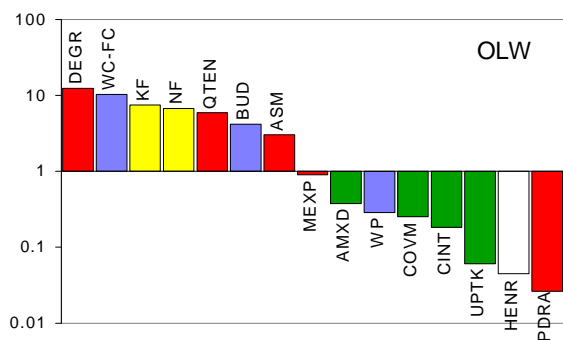
	OLW		OTW		OLH		OTH	
1	DEGR	12.3	KF	274.3	DEGR	110.5	DEGR	16384
2	WC-FC	10.3	DEGR	197.9	WC-FC	67.8	KF	14425
3	KF	7.54	NF	167.3	NF	36.7	NF	6923
4	NF	6.75	WC-FC	37.8	KF	34.5	WC-FC	450
5	QTEN	5.98	BUD	23.2	QTEN	17.3	QTEN	94.1
6	BUD	4.15	QTEN	22.3	BUD	8.13	BUD	46.5
7	ASM	3.00	ASM	12.2	ASM	7.32	ASM	32.0
8	MEXP	0.906	MEXP	5.42	MEXP	1.03	MEXP	4.16
9	AMXD	0.375	COVM	0.760	WP	0.683	CINT	0.865
10	WP	0.288	CINT	0.730	COVM	0.376	COVM	0.864
11	COVM	0.255	UPTK	0.375	CINT	0.300	WP	0.517
12	CINT	0.184	AMXD	0.343	AMXD	0.197	UPTK	0.355
13	UPTK	0.061	WP	0.335	UPTK	0.059	AMXD	0.331
14	HENR	0.045	FEXT	0.046	HENR	0.039	FEXT	0.046
15	PDRA	0.026	PDRA	0.038	FEXT	0.033	PDRA	0.039

**The 15 most influential parameters on the prediction of pesticide losses
by PELMO for the four scenarios (classification by MAROV values).**



Sensitivity of recharge predicted by PELMO
Parameters have been classified into categories as follows





Sensitivity of pesticide losses predicted by PELMO
The 15 most influential parameters have been classified into categories as follows



One-at-a-time sensitivity analysis for PRZM (version 3.14b)

Abbreviation	Parameter description
A	Albedo
AMXD	Maximum rooting depth
ANET	Minimum depth for extraction of evaporation
ASM	Reference moisture for degradation
BD	Bulk density
CINT	Maximum interception storage
COVM	Maximum areal coverage of canopy
DEG	Degradation rate
EM	Emmissivity
FC	Field capacity
FEXT	Foliar extraction coefficient
HTMA	Maximum canopy height
KD	Freundlich coefficient
MEXP	Moisture exponent for degradation
NF	Freundlich exponent
OC	Organic carbon content
PLDK	Pesticide decay rate on canopy
QTEN	qten
T	Average monthly temp at BB
TINI	Initial temp of the horizon
UPTK	Plant uptake factor
WP	Wilting point

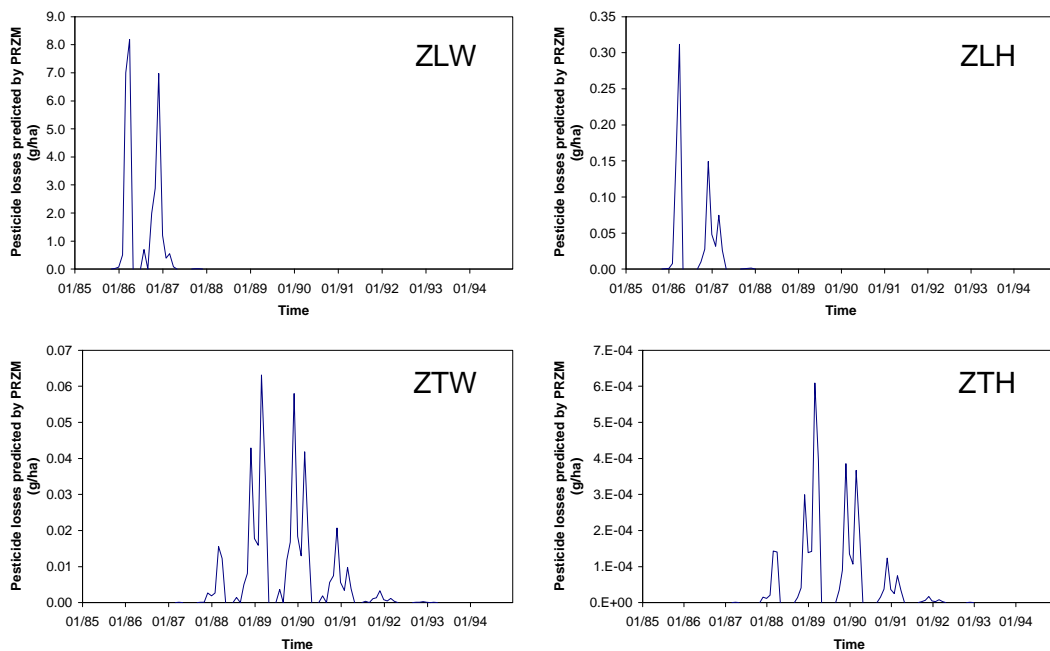
List of PRZM parameters included in the sensitivity analyses

	Recharge (mm)				Pesticide losses at 1-m depth (g/ha)			
	ZLW	ZTW	ZLH	ZTH	ZLW	ZTW	ZLH	ZTH
1985	350	350	347	347	0.03	<0.01	<0.01	<0.01
1986	305	305	293	293	28.8	<0.01	0.67	<0.01
1987	305	305	293	293	2.85	<0.01	0.22	<0.01
1988	306	306	294	294	<0.01	0.09	<0.01	<0.01
1989	305	305	293	293	<0.01	0.24	<0.01	<0.01
1990	305	305	293	293	<0.01	0.14	<0.01	<0.01
1991	305	305	293	293	<0.01	0.03	<0.01	<0.01
1992	297	297	281	281	<0.01	<0.01	<0.01	<0.01
1993	297	297	280	280	<0.01	<0.01	<0.01	<0.01
1994	297	297	280	280	<0.01	<0.01	<0.01	<0.01

Annual recharge and pesticide losses predicted by PRZM for the four scenarios

	ZLW	ZTW	ZLH	ZTH
Number of years	10	10	10	10
Total recharge (mm)	3071	3071	2948	2948
Total pesticide losses at 1-m depth (g/ha)	31.7	0.52	0.89	4.04×10^{-3}
Total pesticide losses at 1-m depth (% applied)	1.59	0.03	0.04	2.02×10^{-4}

Accumulated recharge and pesticide losses predicted by PRZM for the four scenarios



Monthly pesticide losses predicted by PRZM for the four scenarios (g/ha)

Variation of parameters (ZLW)

Variations were attributed through yellow cells

	Initial value	Variation range					
		Lower val.	Upper val.	Lower Perc	Upper Perc	Lower Mult.	Upper Mult.
anet	15	5	25	-66.67	66.67	0.33	1.67
cint	0.15	0.1	0.3	-33.33	100.00	0.67	2.00
amxd	60	30	100	-50.00	66.67	0.50	1.67
covm	90	80	100	-11.11	11.11	0.89	1.11
htma	55	45	65	-18.18	18.18	0.82	1.18
uptk	0.5	0	1	-100.00	100.00	0.00	2.00
pldk	0.0893	0.04465	0.1786	-50.00	100.00	0.5	2
fext	0.1	0.05	0.15	-50.00	50.00	0.50	1.50
henr	5.00E-07	5.00E-08	5.00E-06	-90.00	900.00	0.10	10.00
enpy	20	15	25	-25.00	25.00	0.75	1.25
nf	0.9	0.72	1.08	-20	20	0.80	1.20
a	0.18	0.1206	0.2394	-33	33	0.67	1.33
em	0.96	0.94	0.98	-2.08	2.08	0.98	1.02
t	8	6	10	-25.00	25.00	0.75	1.25
qten	2.2	1.82	2.72	-17.27	23.64	0.83	1.24
mexp	0.7	0.42	0.98	-40	40	0.60	1.40
asm	0.2775	0.197	0.346875	-29.01	25	0.71	1.25
bd1	1.35	1.215	1.485	-10	10	0.90	1.10
deg1	0.0893	0.04465	0.1786	-50.00	100.00	0.5	2
fc1	0.2775	0.197	0.346875	-29.01	25	0.71	1.25
wp1	0.1054	0.07905	0.13175	-25	25	0.75	1.25
oc1	1.7	1.5	1.9	-11.76	11.76	0.88	1.12
kd1	0.34	0.17	0.68	-50.00	100.00	0.5	2
tini	8	6	10	-25.00	25.00	0.75	1.25
bd3	1.45	1.305	1.595	-10	10	0.90	1.10
deg3	0.0504	0.0252	0.1008	-50.00	100.00	0.5	2
fc3	0.1913	0.142	0.239125	-25.77	25	0.74	1.25
wp3	0.0794	0.05955	0.09925	-25	25	0.75	1.25
oc3	0.8	0.70592	0.89408	-11.76	11.76	0.88	1.12
kd3	0.16	0.08	0.32	-50.00	100.00	0.5	2
bd4	1.41	1.269	1.551	-10	10	0.90	1.10
deg4	0.0265	0.01325	0.053	-50.00	100.00	0.5	2
fc4	0.1469	0.087	0.183625	-40.78	25	0.59	1.25
wp4	0.0437	0.032775	0.054625	-25	25	0.75	1.25
oc4	0.3	0.26472	0.33528	-11.76	11.76	0.88	1.12
kd4	0.06	0.03	0.12	-50.00	100.00	0.5	2
bd5	1.53	1.377	1.683	-10	10	0.90	1.10
deg5	0.0211	0.01055	0.0422	-50.00	100.00	0.5	2
fc5	0.1923	0.1344	0.240375	-30.11	25	0.70	1.25
wp5	0.0765	0.057375	0.095625	-25	25	0.75	1.25
oc5	0.2	0.17648	0.22352	-11.76	11.76	0.88	1.12
kd5	0.04	0.02	0.08	-50.00	100.00	0.5	2

Variation attributed to PRZM input parameters
Pesticide L on Wick scenario

Variation of parameters (ZTW)

Variations were attributed through yellow cells

	Initial value	Variation range					
		Lower val.	Upper val.	Lower Perc	Upper Perc	Lower Mult.	Upper Mult.
anet	15	5	25	-66.67	66.67	0.33	1.67
cint	0.15	0.1	0.3	-33.33	100.00	0.67	2.00
amxd	60	30	100	-50.00	66.67	0.50	1.67
covm	90	80	100	-11.11	11.11	0.89	1.11
htma	55	45	65	-18.18	18.18	0.82	1.18
uptk	0.5	0	1	-100.00	100.00	0.00	2.00
pldk	0.0298	0.0149	0.0596	-50.00	100.00	0.5	2
fext	0.1	0.05	0.15	-50.00	50.00	0.50	1.50
enpy	20	15	25	-25.00	25.00	0.75	1.25
nf	0.9	0.72	1.08	-20	20	0.80	1.20
a	0.18	0.1206	0.2394	-33	33	0.67	1.33
em	0.96	0.94	0.98	-2.08	2.08	0.98	1.02
t	8	6	10	-25.00	25.00	0.75	1.25
qten	2.2	1.82	2.72	-17.27	23.64	0.83	1.24
mexp	0.7	0.42	0.98	-40	40	0.60	1.40
asm	0.2775	0.197	0.346875	-29.01	25	0.71	1.25
bd1	1.35	1.215	1.485	-10	10	0.90	1.10
deg1	0.0298	0.0149	0.0596	-50.00	100.00	0.5	2
fc1	0.2775	0.197	0.346875	-29.01	25	0.71	1.25
wp1	0.1054	0.07905	0.13175	-25	25	0.75	1.25
oc1	1.7	1.5	1.9	-11.76	11.76	0.88	1.12
kd1	1.7	0.85	3.4	-50.00	100.00	0.5	2
tini	8	6	10	-25.00	25.00	0.75	1.25
bd3	1.45	1.305	1.595	-10	10	0.90	1.10
deg3	0.0184	0.0092	0.0368	-50.00	100.00	0.5	2
fc3	0.1913	0.142	0.239125	-25.77	25	0.74	1.25
wp3	0.0794	0.05955	0.09925	-25	25	0.75	1.25
oc3	0.8	0.70592	0.89408	-11.76	11.76	0.88	1.12
kd3	0.8	0.4	1.6	-50.00	100.00	0.5	2
bd4	1.41	1.269	1.551	-10	10	0.90	1.10
deg4	0.0126	0.0063	0.0252	-50.00	100.00	0.5	2
fc4	0.1469	0.087	0.183625	-40.78	25	0.59	1.25
wp4	0.0437	0.032775	0.054625	-25	25	0.75	1.25
oc4	0.3	0.26472	0.33528	-11.76	11.76	0.88	1.12
kd4	0.3	0.15	0.6	-50.00	100.00	0.5	2
bd5	1.53	1.377	1.683	-10	10	0.90	1.10
deg5	0.0125	0.00625	0.025	-50.00	100.00	0.5	2
fc5	0.1923	0.1344	0.240375	-30.11	25	0.70	1.25
wp5	0.0765	0.057375	0.095625	-25	25	0.75	1.25
oc5	0.2	0.17648	0.22352	-11.76	11.76	0.88	1.12
kd5	0.2	0.1	0.4	-50.00	100.00	0.5	2

Variation attributed to PRZM input parameters
Pesticide T on Wick scenario

Variation of parameters (ZLH)

Variations were attributed through yellow cells

	Initial value	Variation range					
		Lower val.	Upper val.	Lower Perc	Upper Perc	Lower Mult.	Upper Mult.
anet	15	5	25	-66.67	66.67	0.33	1.67
cint	0.15	0.1	0.3	-33.33	100.00	0.67	2.00
amxd	60	30	100	-50.00	66.67	0.50	1.67
covm	90	80	100	-11.11	11.11	0.89	1.11
htma	55	45	65	-18.18	18.18	0.82	1.18
uptk	0.5	0	1	-100.00	100.00	0.00	2.00
pldk	0.0893	0.04465	0.1786	-50.00	100.00	0.5	2
fext	0.1	0.05	0.15	-50.00	50.00	0.50	1.50
henr	5.00E-07	5E-08	5.00E-06	-90.00	900.00	0.10	10.00
enpy	20	15	25	-25.00	25.00	0.75	1.25
nf	0.9	0.72	1.08	-20	20	0.80	1.20
a	0.18	0.1206	0.2394	-33	33	0.67	1.33
em	0.96	0.94	0.98	-2.08	2.08	0.98	1.02
t	8	6	10	-25.00	25.00	0.75	1.25
qten	2.2	1.82	2.72	-17.27	23.64	0.83	1.24
mexp	0.7	0.42	0.98	-40	40	0.60	1.40
asm	0.349	0.197	0.43625	-43.55	25	0.56	1.25
bd1	1.39	1.251	1.529	-10	10	0.90	1.10
deg1	0.0893	0.04465	0.1786	-50.00	100.00	0.5	2
fc1	0.349	0.197	0.43625	-43.55	25	0.56	1.25
wp1	0.168	0.126	0.21	-25	25	0.75	1.25
oc1	1.15	1.5	1.9	30.43	65.22	1.30	1.65
kd1	0.23	0.115	0.46	-50.00	100.00	0.5	2
tini	8	6	10	-25.00	25.00	0.75	1.25
bd3	1.62	1.458	1.782	-10	10	0.90	1.10
deg3	0.0474	0.0237	0.0948	-50.00	100.00	0.5	2
fc3	0.308	0.142	0.385	-53.90	25	0.46	1.25
wp3	0.179	0.13425	0.22375	-25	25	0.75	1.25
oc3	0.48	0.423552	0.536448	-11.76	11.76	0.88	1.12
kd3	0.096	0.048	0.192	-50.00	100.00	0.5	2
bd4	1.55	1.395	1.705	-10	10	0.90	1.10
deg4	0.043	0.0215	0.086	-50.00	100.00	0.5	2
fc4	0.322	0.087	0.4025	-72.98	25	0.27	1.25
wp4	0.199	0.14925	0.24875	-25	25	0.75	1.25
oc4	0.4	0.35296	0.44704	-11.76	11.76	0.88	1.12
kd4	0.08	0.04	0.16	-50.00	100.00	0.5	2
bd5	1.48	1.332	1.628	-10	10	0.90	1.10
deg5	0.0358	0.0179	0.0716	-50.00	100.00	0.5	2
fc5	0.358	0.1344	0.4475	-62.46	25	0.38	1.25
wp5	0.201	0.15075	0.25125	-25	25	0.75	1.25
oc5	0.3	0.26472	0.33528	-11.76	11.76	0.88	1.12
kd5	0.06	0.03	0.12	-50.00	100.00	0.5	2

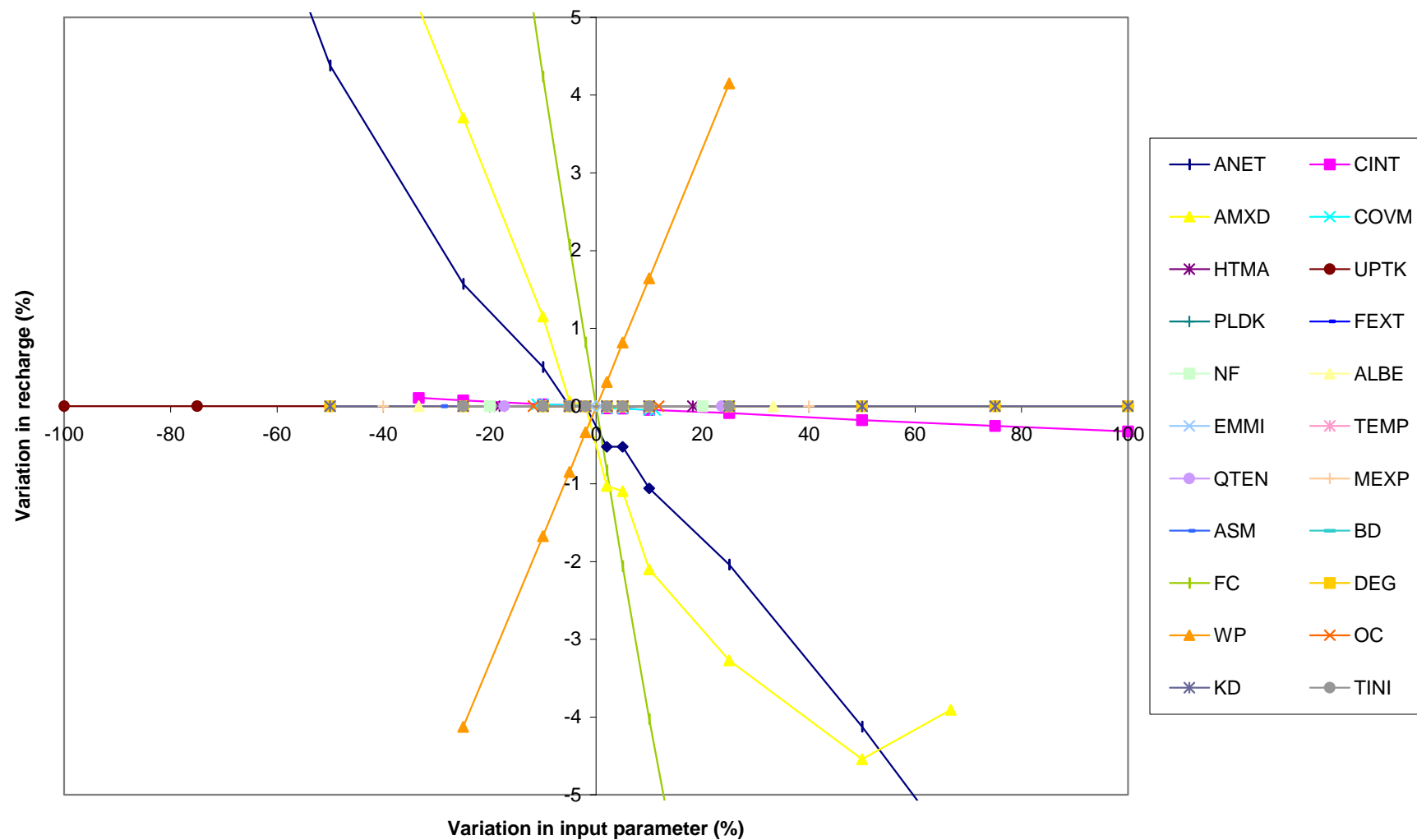
Variation attributed to PRZM input parameters
Pesticide L on Hodnet scenario

Variation of parameters (ZTH)

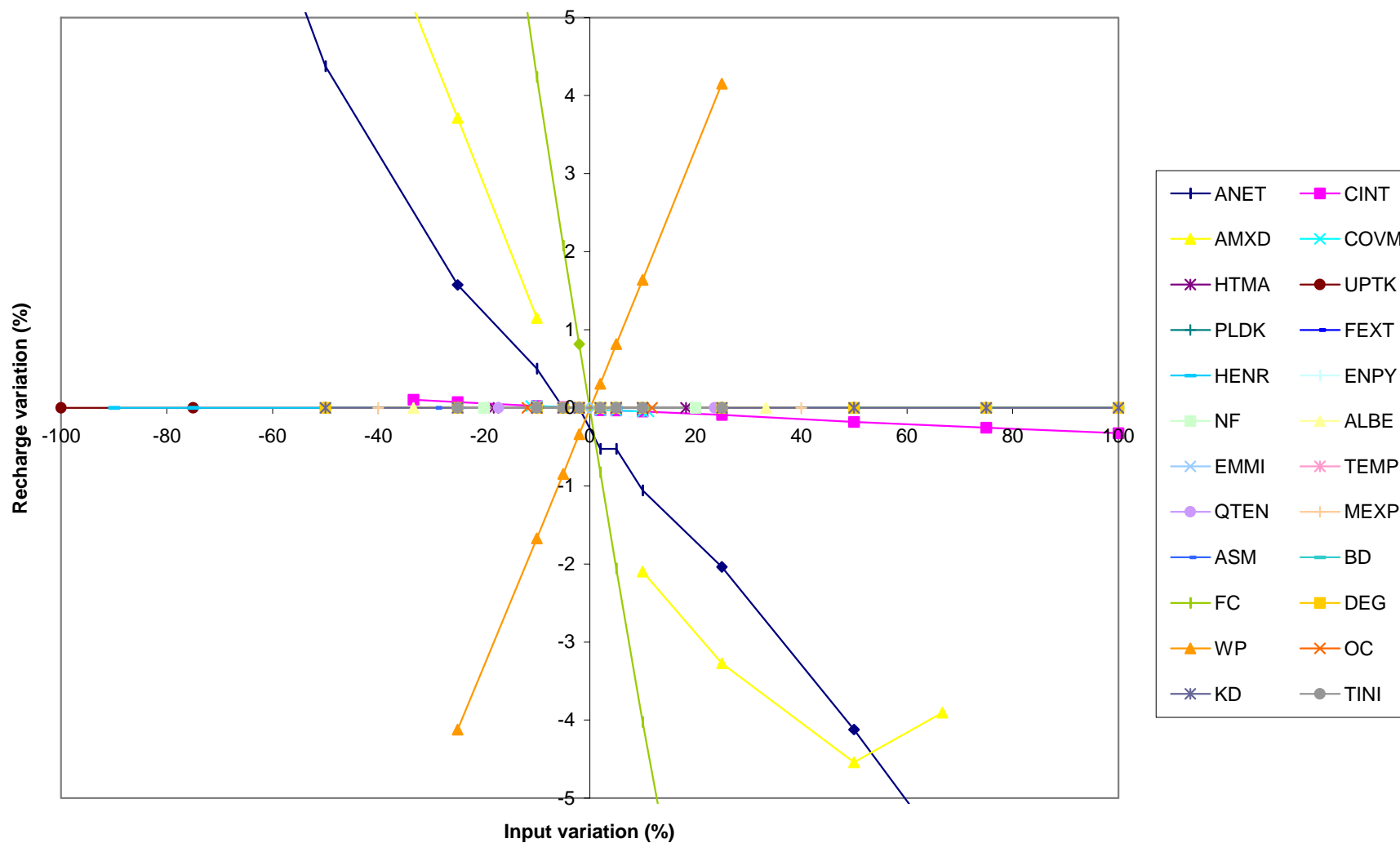
Variations were attributed through yellow cells

	Initial value	Variation range					
		Lower val.	Upper val.	Lower Perc	Upper Perc	Lower Mult.	Upper Mult.
anet	15	5	25	-66.67	66.67	0.33	1.67
cint	0.15	0.1	0.3	-33.33	100.00	0.67	2.00
amxd	60	30	100	-50.00	66.67	0.50	1.67
covm	90	80	100	-11.11	11.11	0.89	1.11
htma	55	45	65	-18.18	18.18	0.82	1.18
uptk	0.5	0	1	-100.00	100.00	0.00	2.00
pldk	0.0298	0.0149	0.0596	-50.00	100.00	0.5	2
fext	0.1	0.05	0.15	-50.00	50.00	0.50	1.50
enpy	20	15	25	-25.00	25.00	0.75	1.25
nf	0.9	0.72	1.08	-20	20	0.80	1.20
a	0.18	0.1206	0.2394	-33	33	0.67	1.33
em	0.96	0.94	0.98	-2.08	2.08	0.98	1.02
t	8	6	10	-25.00	25.00	0.75	1.25
qten	2.2	1.82	2.72	-17.27	23.64	0.83	1.24
mexp	0.7	0.42	0.98	-40	40	0.60	1.40
asm	0.2775	0.197	0.346875	-29.01	25	0.71	1.25
bd1	1.35	1.215	1.485	-10	10	0.90	1.10
deg1	0.0298	0.0149	0.0596	-50.00	100.00	0.5	2
fc1	0.2775	0.197	0.346875	-29.01	25	0.71	1.25
wp1	0.1054	0.07905	0.13175	-25	25	0.75	1.25
oc1	1.7	1.5	1.9	-11.76	11.76	0.88	1.12
kd1	1.7	0.85	3.4	-50.00	100.00	0.5	2
tini	8	6	10	-25.00	25.00	0.75	1.25
bd3	1.45	1.305	1.595	-10	10	0.90	1.10
deg3	0.0184	0.0092	0.0368	-50.00	100.00	0.5	2
fc3	0.1913	0.142	0.239125	-25.77	25	0.74	1.25
wp3	0.0794	0.05955	0.09925	-25	25	0.75	1.25
oc3	0.8	0.70592	0.89408	-11.76	11.76	0.88	1.12
kd3	0.8	0.4	1.6	-50.00	100.00	0.5	2
bd4	1.41	1.269	1.551	-10	10	0.90	1.10
deg4	0.0126	0.0063	0.0252	-50.00	100.00	0.5	2
fc4	0.1469	0.087	0.183625	-40.78	25	0.59	1.25
wp4	0.0437	0.032775	0.054625	-25	25	0.75	1.25
oc4	0.3	0.26472	0.33528	-11.76	11.76	0.88	1.12
kd4	0.3	0.15	0.6	-50.00	100.00	0.5	2
bd5	1.53	1.377	1.683	-10	10	0.90	1.10
deg5	0.0125	0.00625	0.025	-50.00	100.00	0.5	2
fc5	0.1923	0.1344	0.240375	-30.11	25	0.70	1.25
wp5	0.0765	0.057375	0.095625	-25	25	0.75	1.25
oc5	0.2	0.17648	0.22352	-11.76	11.76	0.88	1.12
kd5	0.2	0.1	0.4	-50.00	100.00	0.5	2

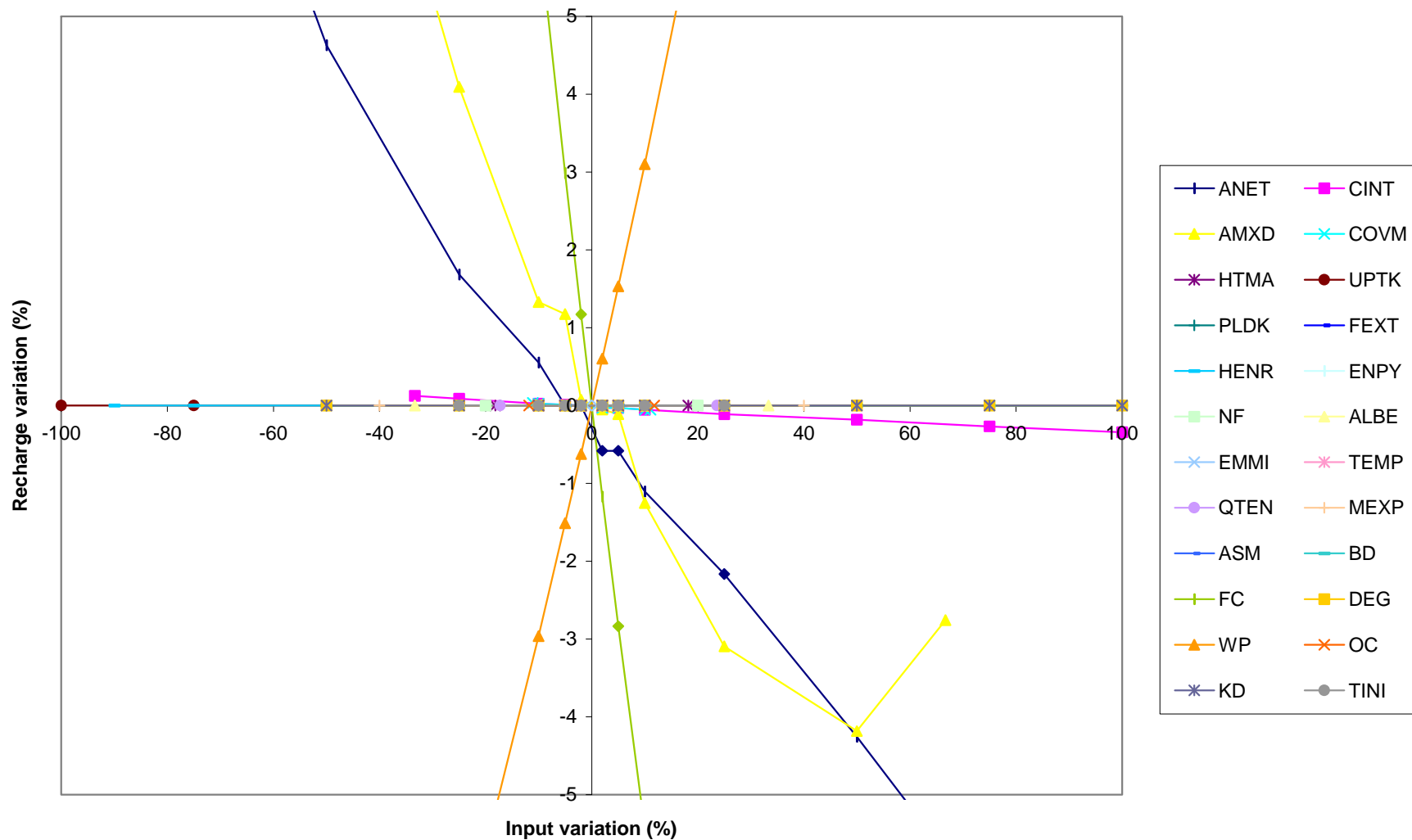
Variation attributed to PRZM input parameters
Pesticide T on Hodnet scenario



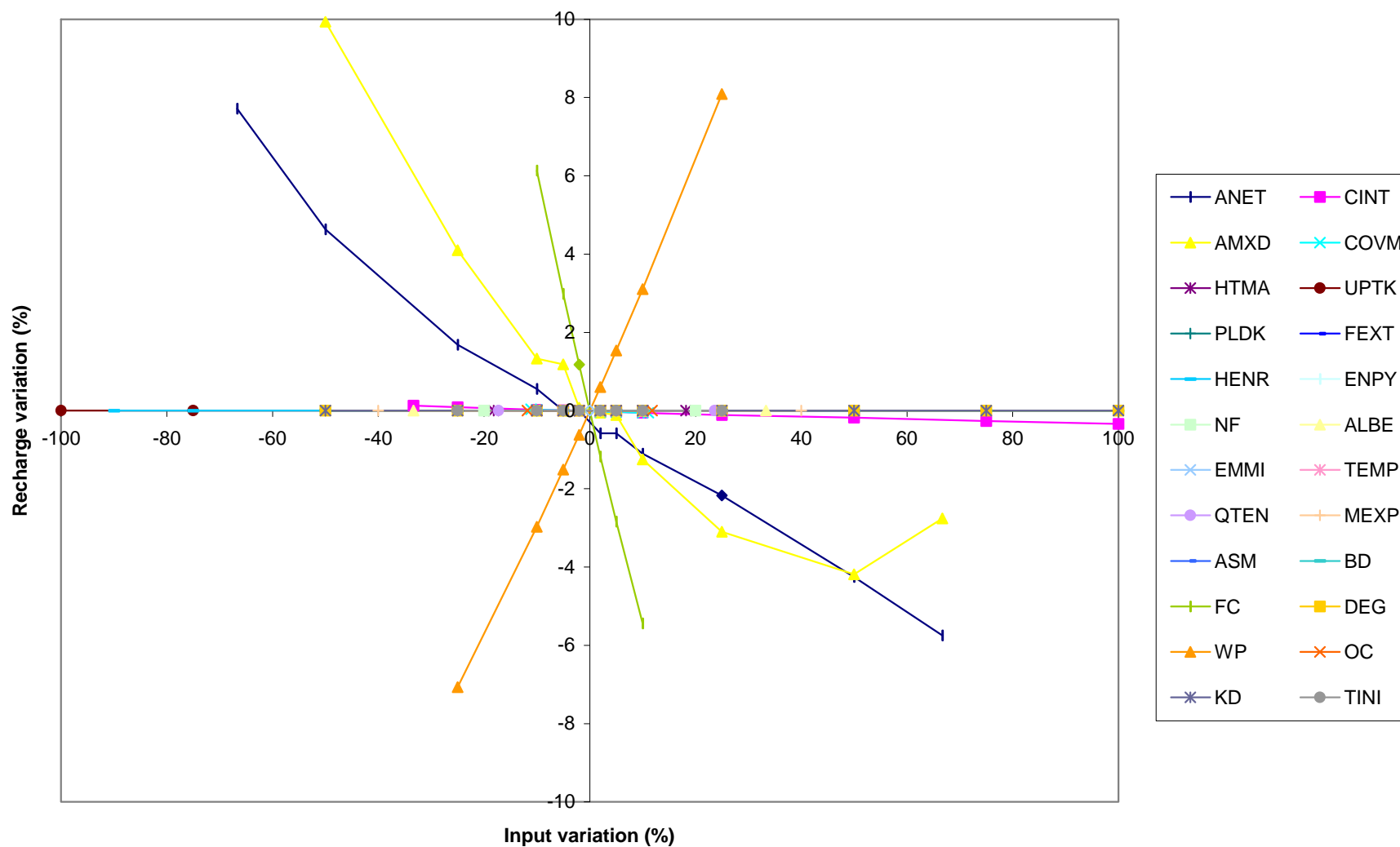
Influence of the variation of input parameters on recharge predicted by PRZM
Pesticide L on Wick scenario



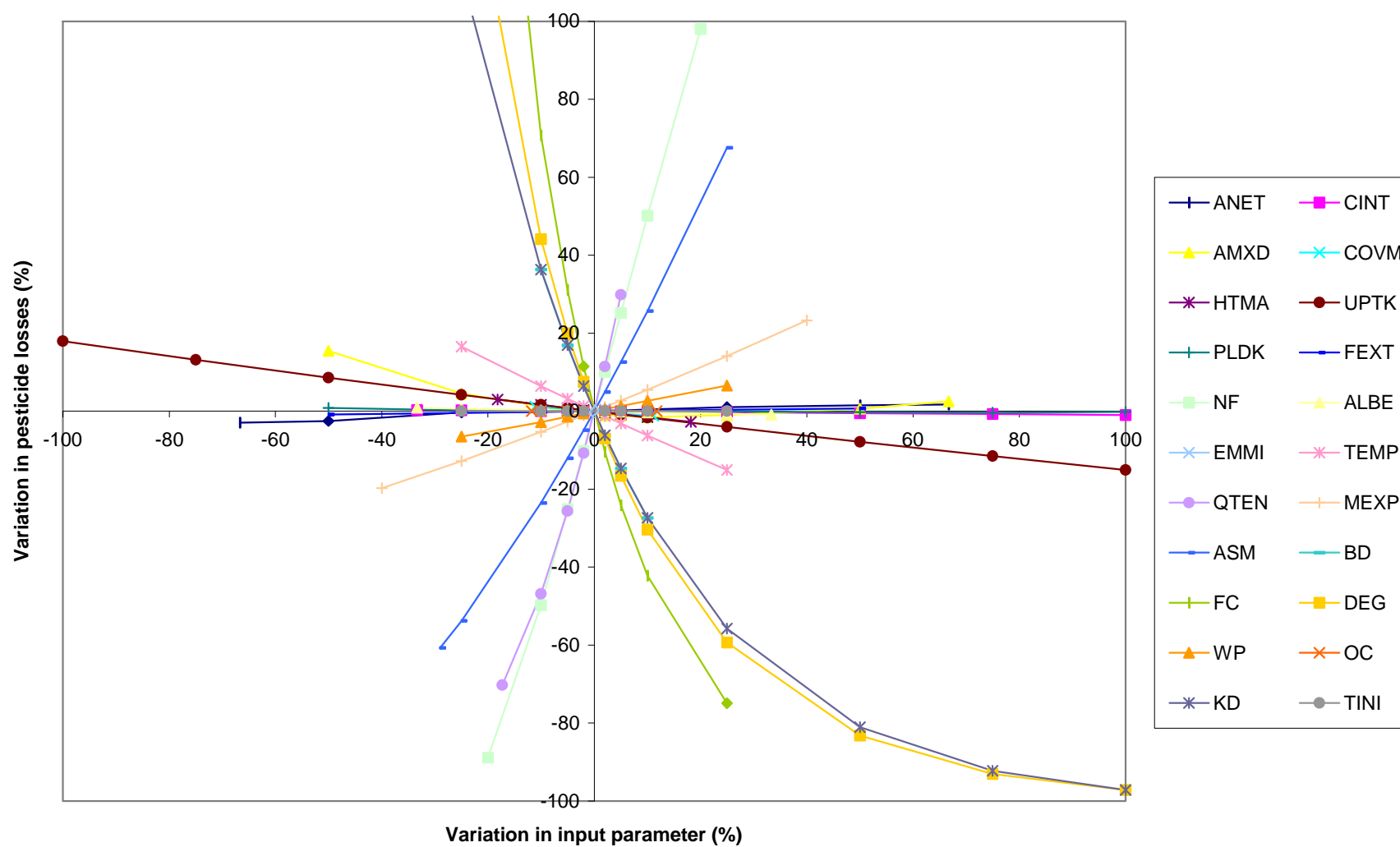
Influence of the variation of input parameters on recharge predicted by PRZM
Pesticide T on Wick scenario



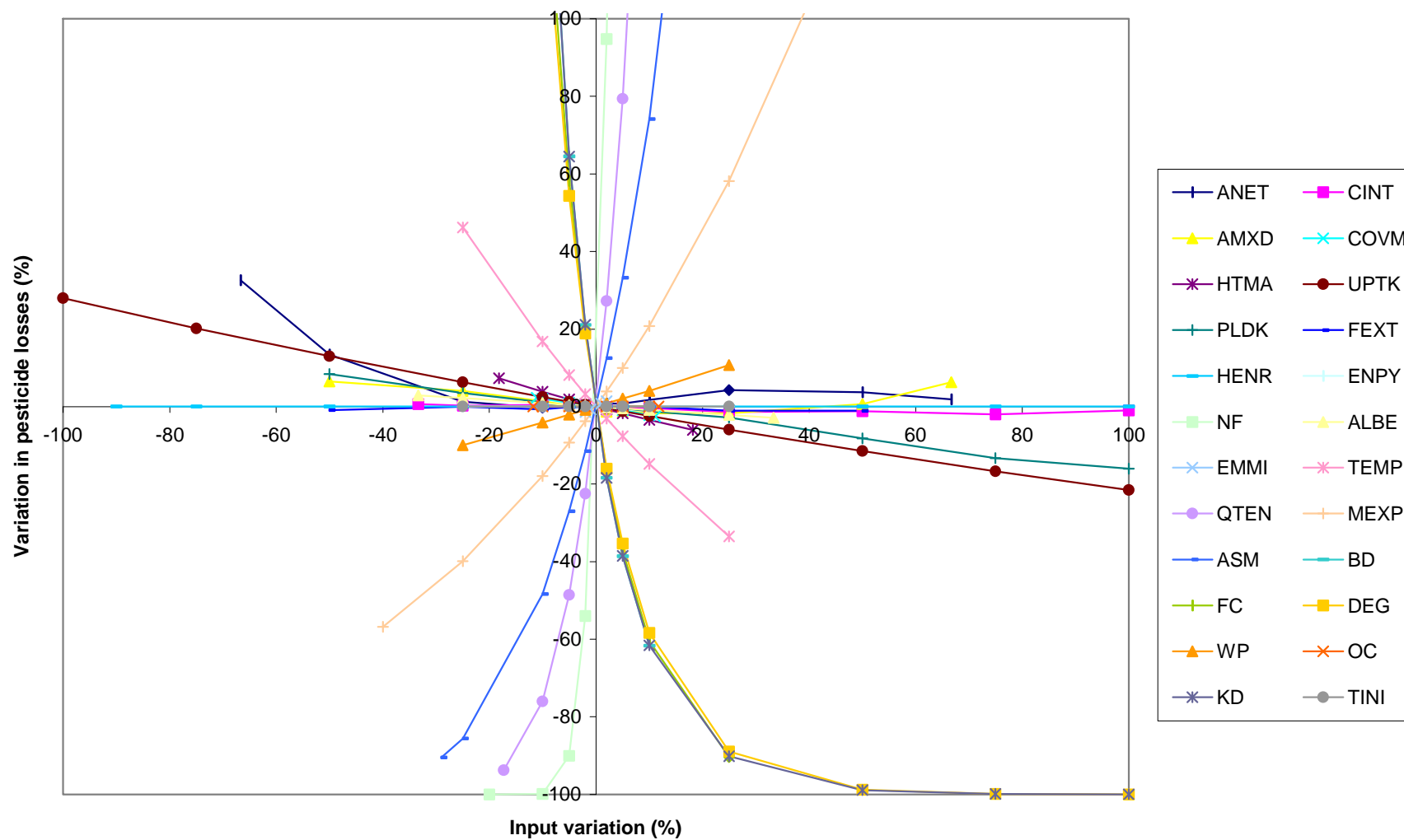
Influence of the variation of input parameters on recharge predicted by PRZM
Pesticide L on Hodnet scenario



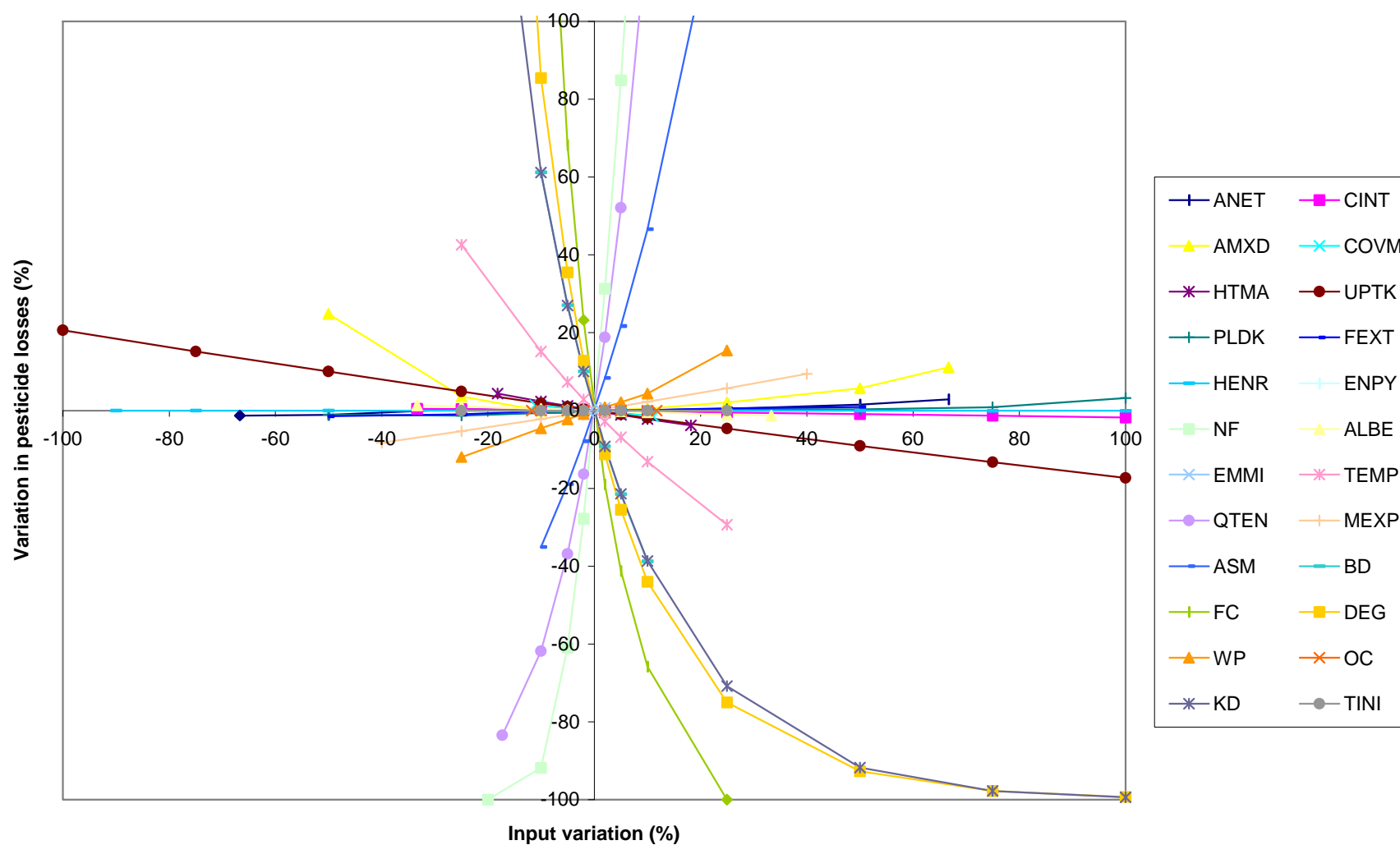
Influence of the variation of input parameters on recharge predicted by PRZM
Pesticide T on Hodnet scenario



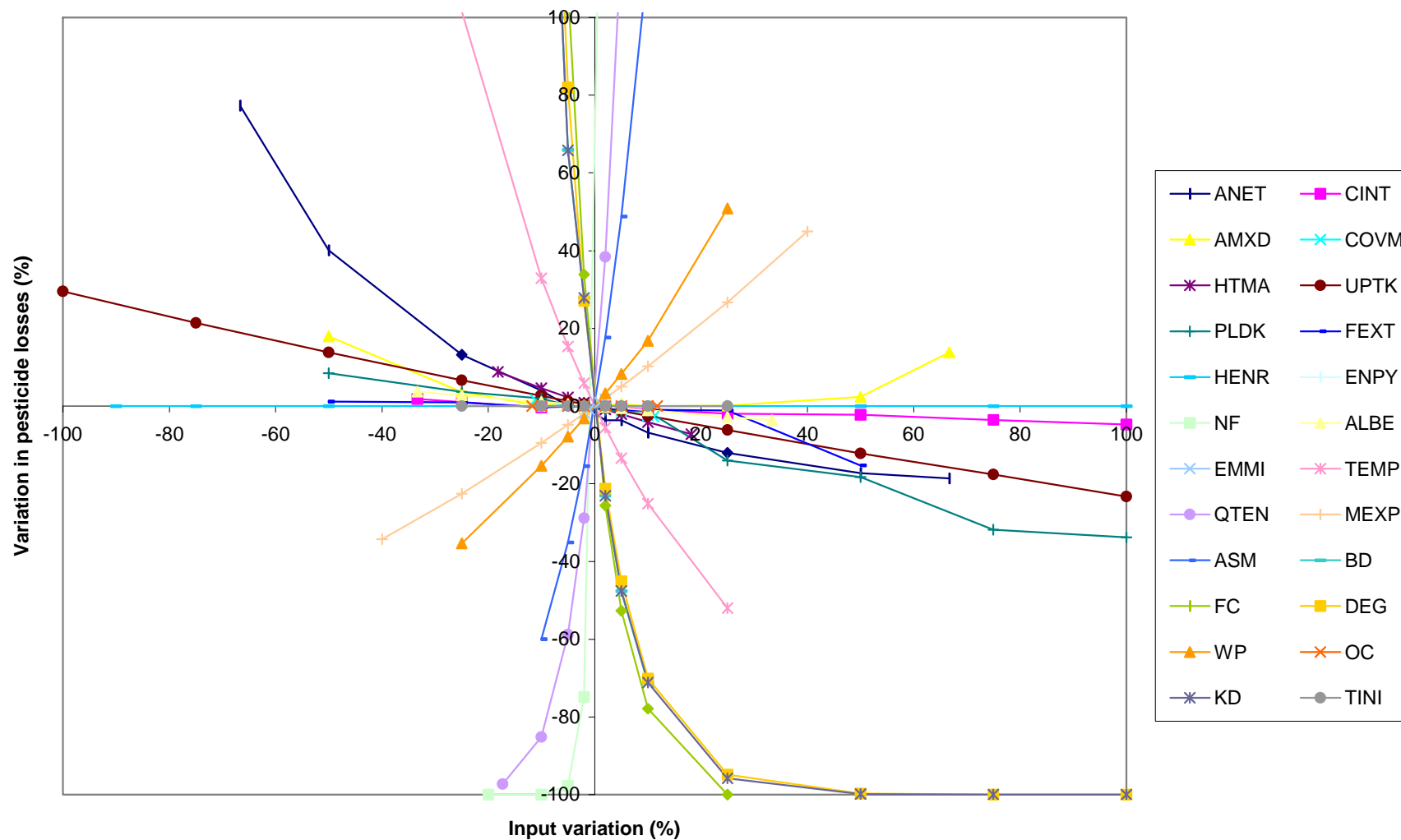
Influence of the variation of input parameters on pesticide losses predicted by PRZM
Pesticide L on Wick scenario



Influence of the variation of input parameters on pesticide losses predicted by PRZM
Pesticide T on Wick scenario



Influence of the variation of input parameters on pesticide losses predicted by PRZM
Pesticide L on Hodnet scenario








Influence of the variation of input parameters on pesticide losses predicted by PRZM
Pesticide T on Hodnet scenario

		Wick		Hodnet		Influence
		Pesticide L	Pesticide T	Pesticide L	Pesticide T	
FC	Field Capacity	0.457	0.457	0.613	0.613	-
ANET	Min. depth for extraction of evap.	0.262	0.262	0.290	0.290	-
WP	Wilting point	0.169	0.169	0.324	0.324	+
AMXD	Maximum rooting depth	0.210	0.210	0.235	0.235	-
CINT	Maximum interception storage	0.015	0.015	0.015	0.015	-
COVM	Maximum areal coverage of canopy	0.015	0.015	0.015	0.015	-
HTMA	Maximum canopy height	0	0	0	0	
UPTK	Plant uptake factor	0	0	0	0	
PLDK	Pesticide decay rate on canopy	0	0	0	0	
FEXT	Foliar extraction coefficient	0	0	0	0	
NF	Freundlich exponent	0	0	0	0	
A	Albedo	0	0	0	0	
EM	Emmissivity	0	0	0	0	
T	Average monthly temp at BB	0	0	0	0	
QTEN	qten	0	0	0	0	
MEXP	Moisture exponent for degradation	0	0	0	0	
ASM	Reference moisture for degradation	0	0	0	0	
BD	Bulk density	0	0	0	0	
DEG	Degradation rate	0	0	0	0	
OC	Organic carbon content	0	0	0	0	
KD	Freundlich coefficient	0	0	0	0	
TINI	Initial temp of the horizon	0	0	0	0	

**Classification of PRZM parameters according to their influence on recharge
(values presented are MAROV)**

A positive influence means that an increase in the value of the parameter will result in an increase in recharge and vice versa

The shades of grey represent a classification of parameters into sensitivity classes as follows:






	Extremely sensitive		Slightly sensitive
	Very sensitive		Insensitive
	Moderately sensitive		

		Wick		Hodnet		Influence
		Pesticide L	Pesticide T	Pesticide L	Pesticide T	
NF	Freundlich exponent	5.1	182.1	21.2	3476.9	+
KD	Freundlich coefficient	6.1	204.6	16.9	1061.1	-
DEG	Degradation rate	11.1	138.9	59.7	1061.9	-
Q TEN	qten	7.4	35.6	18.9	91.4	+
FC	Field Capacity	11.4	43.5	18.6	33.8	-
BD	Bulk density	3.6	17.6	6.1	21.9	-
ASM	Reference moisture for degradation	2.7	9.9	5.6	18.8	+
T	Average monthly temp at BB	0.663	1.8	1.7	4.1	-
MEXP	Moisture exponent for degradation	0.583	2.6	0.234	1.1	+
WP	Wilting point	0.282	0.430	0.618	2.0	+
ANET	Min. depth for extraction of evap.	0.099 (+)	0.488 (+/-)	0.043 (+/-)	1.8 (-)	+/-
EM	Emmissivity	0.284	0.753	0.393	0.929	+
AMXD	Maximum rooting depth	0.533 (+/-)	0.649 (+/-)	0.496 (+/-)	0.359 (+/-)	+/-
HTMA	Maximum canopy height	0.164	0.401	0.237	0.485	-
UPTK	Plant uptake factor	0.180	0.279	0.206	0.295	-
PLDK	Pesticide decay rate on canopy	0.017 (-)	0.177 (-)	0.114 (+)	0.613 (-)	+/-
COVM	Maximum areal coverage of canopy	0.114	0.230	0.137	0.266	-
FEXT	Foliar extraction coefficient	0.019 (+)	0.072 (+/-)	0.039 (+)	0.306 (+/-)	+/-
A	Albedo	0.035	0.102	0.050	0.126	-
CINT	Maximum interception storage	0.013	0.056	0.028	0.088	-
OC	Organic carbon content	0	0	0	0	
TINI	Initial temp of the horizon	0	0	0	0	

**Classification of PRZM parameters according to their influence on pesticide losses
(values presented are MAROV)**

A positive influence means that an increase in the value of the parameter will result in an increase in pesticide losses and vice versa

The shades of grey represent a classification of parameters into sensitivity classes as follows:

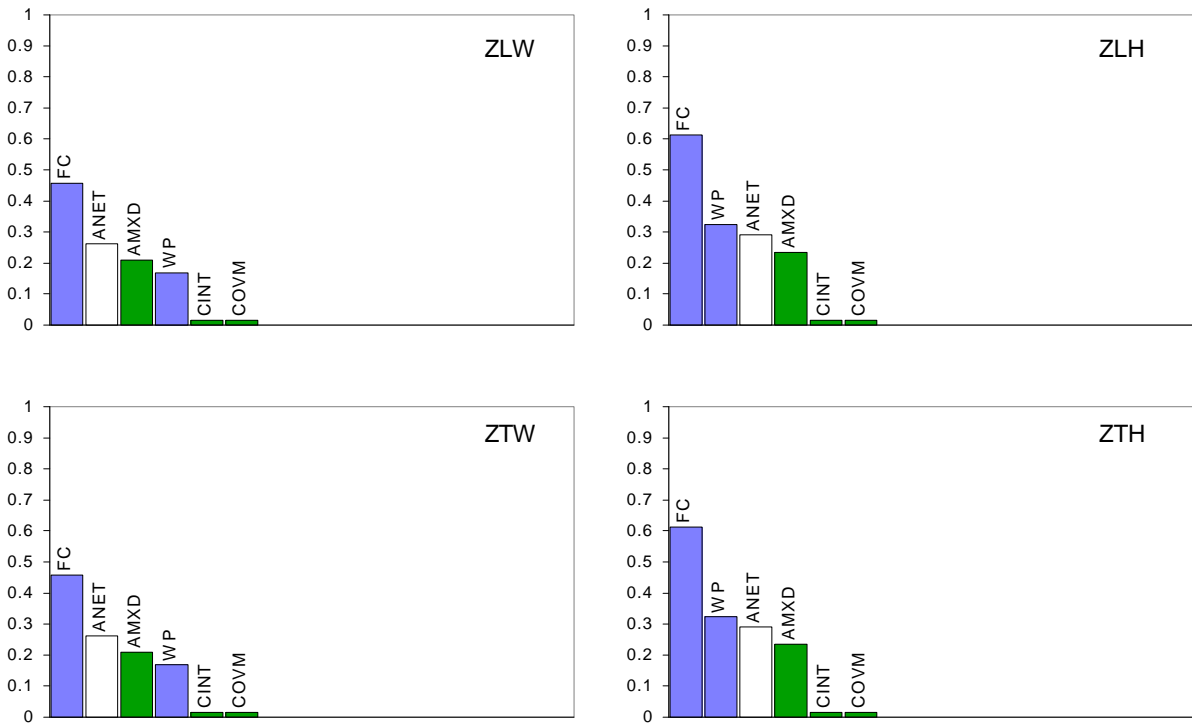
	Extremely sensitive		Slightly sensitive
	Very sensitive		Insensitive
	Moderately sensitive		

	ZLW		ZTW		ZLH		ZTH	
1	FC	0.457	FC	0.457	FC	0.613	FC	0.613
2	ANET	0.262	ANET	0.262	WP	0.324	WP	0.324
3	AMXD	0.21	AMXD	0.21	ANET	0.29	ANET	0.29
4	WP	0.169	WP	0.169	AMXD	0.235	AMXD	0.235
5	CINT	0.015	CINT	0.015	CINT	0.015	CINT	0.015
6	COVM	0.015	COVM	0.015	COVM	0.015	COVM	0.015
7	HTMA	0	HTMA	0	HTMA	0	HTMA	0
8	UPTK	0	UPTK	0	UPTK	0	UPTK	0
9	PLDK	0	PLDK	0	PLDK	0	PLDK	0
10	FEXT	0	FEXT	0	FEXT	0	FEXT	0
11	NF	0	NF	0	NF	0	NF	0
12	A	0	A	0	A	0	A	0
13	EM	0	EM	0	EM	0	EM	0
14	T	0	T	0	T	0	T	0
15	QTEN	0	QTEN	0	QTEN	0	QTEN	0

**The 15 most influential parameters on the prediction of recharge
by PRZM for the four scenarios (classification by MAROV values).**

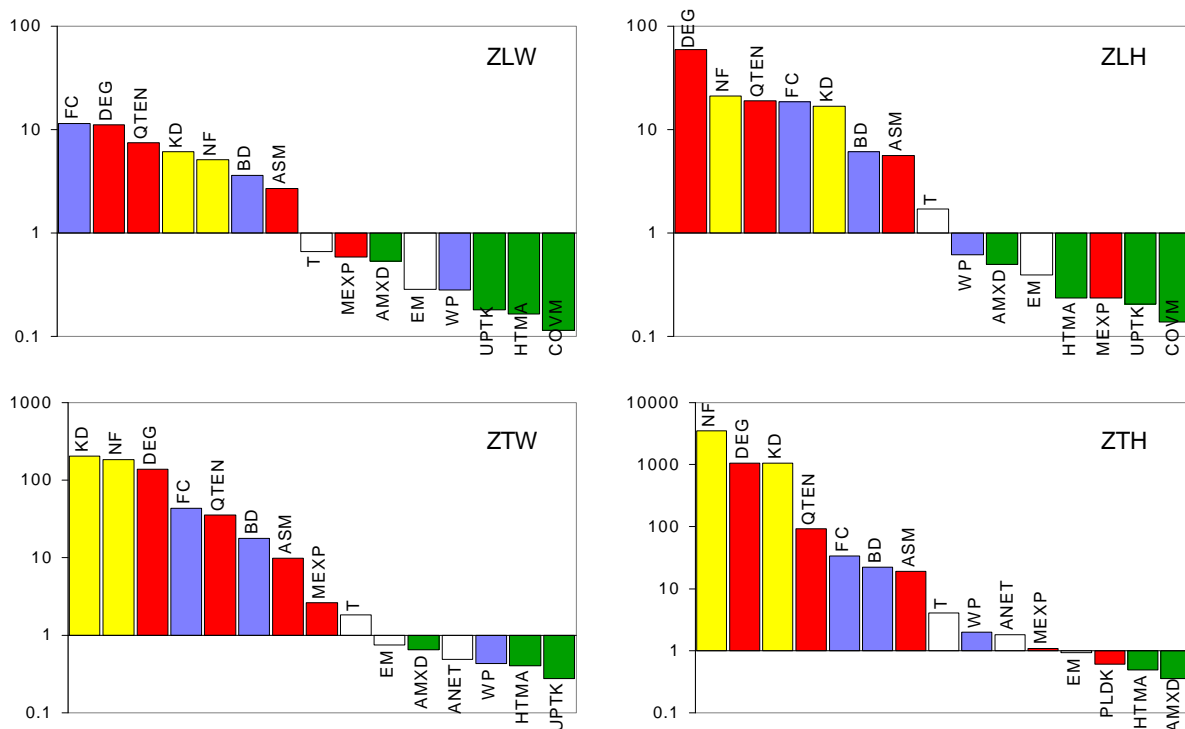
	ZLW		ZTW		ZLH		ZTH	
1	FC	11.4	KD	204.6	DEG	59.7	NF	3476.9
2	DEG	11.1	NF	182.1	NF	21.2	DEG	1061.9
3	QTEN	7.4	DEG	138.9	QTEN	18.9	KD	1061.1
4	KD	6.1	FC	43.5	FC	18.6	QTEN	91.4
5	NF	5.1	QTEN	35.6	KD	16.9	FC	33.8
6	BD	3.6	BD	17.6	BD	6.1	BD	21.9
7	ASM	2.7	ASM	9.9	ASM	5.6	ASM	18.8
8	T	0.663	MEXP	2.6	T	1.7	T	4.1
9	MEXP	0.583	T	1.848	WP	0.618	WP	2.0
10	AMXD	0.533	EM	0.753	AMXD	0.496	ANET	1.8
11	EM	0.284	AMXD	0.649	EM	0.393	MEXP	1.1
12	WP	0.282	ANET	0.488	HTMA	0.237	EM	0.929
13	UPTK	0.180	WP	0.430	MEXP	0.234	PLDK	0.613
14	HTMA	0.164	HTMA	0.401	UPTK	0.206	HTMA	0.485
15	COVM	0.114	UPTK	0.279	COVM	0.137	AMXD	0.359

**The 15 most influential parameters on the prediction of pesticide losses
by PRZM for the four scenarios (classification by MAROV values).**



Sensitivity of recharge predicted by PRZM
Parameters have been classified into categories as follows





Sensitivity of pesticide losses predicted by PRZM

The 15 most influential parameters have been classified into categories as follows



One-at-a-time sensitivity analysis for PESTLA (version 3.4)

Abbreviation	Parameter description
BD	Bulk density
CFLI	Coefficient describing the relationship between the conversion rate and the volume fraction of liquid
CFTB	Crop factor
CFUP	Coefficient of uptake by plants
COFR	Soil evaporation coefficient of Blak and Boesten or Boesten/Stroosnijder
DEG	Degradation rates
EGCV	Molar activation energy of degradation
ENSL	Molar enthalpy of the dissolution process
ENVP	Molar enthalpy of the vaporisation process
FREU	Freundlich exponent
G1	Residual moisture content
G2	Saturated moisture content
G3	Saturated hydraulic conductivity
G4	Alpha main drying curve
G6	Parameter n
GCTB	Maximum leaf area index
HI	initial pressure heads
IF1	Extinction coefficient for diffuse visible light
IR1	Extinction coefficient for direct visible light
KOM	Kom
LEDS	Lengths of dispersion in liquid phase
ORG	organic matter content
PSA	sand content
RDD	Root density distribution
RDS	maximum rooting depth allowed by soil profile
RDTB	maximum rooting depth
RSIG	Minimum rainfall to reset models
SAVP	Saturated vapour pressure
SUAI	Coefficient of diffusion in air
SUWA	Coefficient of diffusion in water
TEMI	initial soil temperatures
THAI	Thickness of the stagnant air layer at soil surface

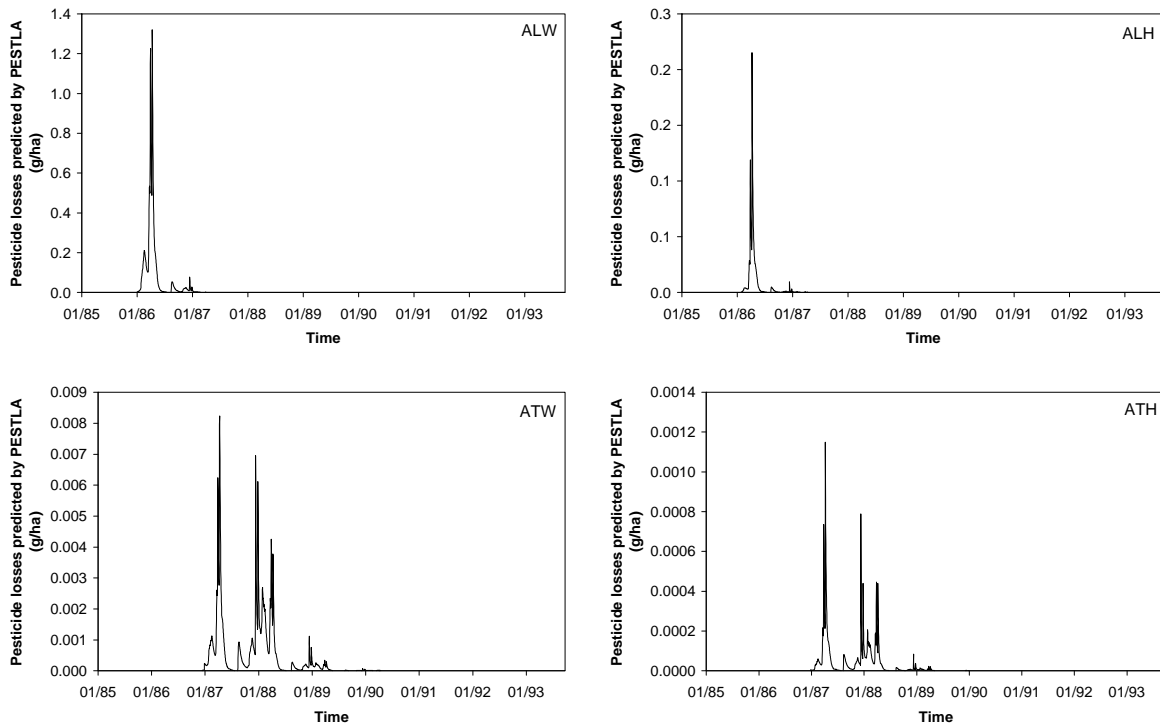
List of PESTLA parameters included in the sensitivity analyses

	Percolation (mm)				Pesticide losses at 1-m depth (g/ha)			
	ALW	ATW	ALH	ATH	ALW	ATW	ALH	ATH
1985	326	326	329	329	<0.01	0	<0.01	0
1986	326	326	329	329	38.50	<0.01	3.22	<0.01
1987	326	326	329	329	0.30	0.34	0.04	0.03
1988	326	326	329	329	0	0.24	0	0.02
1989	326	326	329	329	0	<0.01	0	<0.01
1990	326	326	329	329	0	<0.01	0	0
1991	326	326	329	329	0	0	0	0
1992	326	326	329	329	0	0	0	0

Annual percolation and pesticide losses predicted by PESTLA for the four scenarios

	ALW	ATW	ALH	ATH
Number of years	8	8	8	8
Total percolation (mm)	2608	2608	2632	2632
Total pesticide losses at 1-m depth (g/ha)	38.800	0.606	3.260	0.043
Total pesticide losses at 1-m depth (% applied)	1.84	0.03	0.16	2.1×10^{-3}

Accumulated percolation and pesticide losses predicted by PESTLA for the four scenarios



Daily pesticide losses predicted by PESTLA for the four scenarios (g/ha)

Variation of parameters (ALW)

Variations were attributed through the yellow cells

	Nominal values	Variation range					
		Absolute		Percentage of variation		Multiplication factor	
		Lower val.	Upper val.	Lower	Upper	Lower	Upper
g11	0.1048	0.09432	0.11528	-10	10	0.90	1.10
g12	0.4602	0.41418	0.50622	-10	10	0.90	1.10
g13	288	72	1152	-75	300	0.25	4.00
g14	0.0728	0.06916	0.07644	-5	5	0.95	1.05
g16	1.4508	1.37826	1.52334	-5	5	0.95	1.05
g21	0.0908	0.08172	0.09988	-10	10	0.90	1.10
g22	0.3929	0.35361	0.43219	-10	10	0.90	1.10
g23	360	90	1440	-75	300	0.25	4.00
g24	0.0869	0.082555	0.091245	-5	5	0.95	1.05
g26	1.6286	1.54717	1.71003	-5	5	0.95	1.05
g31	0.052	0.0468	0.0572	-10	10	0.90	1.10
g32	0.3888	0.34992	0.42768	-10	10	0.90	1.10
g33	540	135	2160	-75	300	0.25	4.00
g34	0.0905	0.085975	0.095025	-5	5	0.95	1.05
g36	1.7631	1.674945	1.851255	-5	5	0.95	1.05
g41	0.0715	0.06435	0.07865	-10	10	0.90	1.10
g42	0.3415	0.30735	0.37565	-10	10	0.90	1.10
g43	168	42	672	-75	300	0.25	4.00
g44	0.1011	0.096045	0.106155	-5	5	0.95	1.05
g46	1.4468	1.37446	1.51914	-5	5	0.95	1.05
cofr	0.63	0.58	0.71	-7.94	12.70	0.92	1.13
rsig	0.5	0.25	0.75	-50.00	50.00	0.50	1.50
psa1	0.57	0.513	0.627	-10	10	0.90	1.10
psi1	0.33	0.297	0.363	-10	10	0.90	1.10
pcl1	0.1	0.09	0.11	-10	10	0.90	1.10
org1	0.0292	0.0258	0.0326	-11.76	11.76	0.88	1.12
psa2	0.7	0.63	0.77	-10	10	0.90	1.10
psi2	0.2	0.18	0.22	-10	10	0.90	1.10
pcl2	0.1	0.09	0.11	-10	10	0.90	1.10
org2	0.0138	0.0122	0.0154	-11.76	11.76	0.88	1.12
psa3	0.73	0.657	0.803	-10	10	0.90	1.10
psi3	0.16	0.144	0.176	-10	10	0.90	1.10
pcl3	0.11	0.099	0.121	-10	10	0.90	1.10
org3	0.0052	0.0046	0.0058	-11.76	11.76	0.88	1.12
psa4	0.77	0.693	0.847	-10	10	0.90	1.10
psi4	0.09	0.081	0.099	-10	10	0.90	1.10
pcl4	0.14	0.126	0.154	-10	10	0.90	1.10
org4	0.0034	0.0030	0.0038	-11.76	11.76	0.88	1.12
rds	80	60	100	-25.00	25.00	0.75	1.25
hi	-50	-71	-37	42.00	-26.00	1.42	0.74
temi	8	6	10	-25.00	25.00	0.75	1.25
if1	0.6	0.3	1.2	-50.00	100.00	0.5	2
ir1	0.75	0.375	1.5	-50.00	100.00	0.5	2
gctb	6.2	5.208	7.192	-16	16	0.84	1.16
cftb	0.75	0.5	1	-33.33	33.33	0.67	1.33
rdtb	80	60	100	-25.00	25.00	0.75	1.25
rdd	1	0.75	1	-25.00	0.00	0.75	1.00
bd1	1.35	1.215	1.485	-10	10	0.90	1.10
bd2	1.45	1.305	1.595	-10	10	0.90	1.10
bd3	1.41	1.269	1.551	-10	10	0.90	1.10
bd4	1.53	1.377	1.683	-10	10	0.90	1.10
leds	0.05	0.002	0.1	-96.00	100.00	0.04	2.00
thai	0.01	0.001	0.1	-90.00	900.00	0.10	10.00
suwa	3.97E-05	8.6149E-06	8.6308E-05	-78.3	117.4	0.22	2.17
suai	0.4303	0.21515	0.8606	-50.00	100.00	0.5	2
ensl	40000	20000	80000	-50.00	100.00	0.5	2
savp	0.003	0.0003	0.03	-90	900	0.10	10.00
envp	100000	50000	200000	-50.00	100.00	0.5	2
cfup	0.5	0	1	-100.00	100.00	0.00	2.00
deg	7.762	3.881	15.524	-50.00	100.00	0.5	2
egcv	55000	41250	68750	-25.00	25.00	0.75	1.25
cfli	0.7	0.42	0.98	-40	40	0.60	1.40
kom	11.628	5.814	23.256	-50.00	100.00	0.5	2
freu	0.9	0.72	1.08	-20	20	0.80	1.20

Variation attributed to PESTLA input parameters
Pesticide L on Wick scenario

Variation of parameters (ATW)

Variations were attributed through the yellow cells

	Nominal values	Variation range					
		Absolute		Percentage of variation		Multiplication factor	
		Lower val.	Upper val.	Lower	Upper	Lower	Upper
g11	0.1048	0.09432	0.11528	-10	10	0.90	1.10
g12	0.4602	0.41418	0.50622	-10	10	0.90	1.10
g13	288	72	1152	-75	300	0.25	4.00
g14	0.0728	0.06916	0.07644	-5	5	0.95	1.05
g16	1.4508	1.37826	1.52334	-5	5	0.95	1.05
g21	0.0908	0.08172	0.09988	-10	10	0.90	1.10
g22	0.3929	0.35361	0.43219	-10	10	0.90	1.10
g23	360	90	1440	-75	300	0.25	4.00
g24	0.0869	0.082555	0.091245	-5	5	0.95	1.05
g26	1.6286	1.54717	1.71003	-5	5	0.95	1.05
g31	0.052	0.0468	0.0572	-10	10	0.90	1.10
g32	0.3888	0.34992	0.42768	-10	10	0.90	1.10
g33	540	135	2160	-75	300	0.25	4.00
g34	0.0905	0.085975	0.095025	-5	5	0.95	1.05
g36	1.7631	1.674945	1.851255	-5	5	0.95	1.05
g41	0.0715	0.06435	0.07865	-10	10	0.90	1.10
g42	0.3415	0.30735	0.37565	-10	10	0.90	1.10
g43	168	42	672	-75	300	0.25	4.00
g44	0.1011	0.096045	0.106155	-5	5	0.95	1.05
g46	1.4468	1.37446	1.51914	-5	5	0.95	1.05
cofr	0.63	0.58	0.71	-7.94	12.70	0.92	1.13
rsig	0.5	0.25	0.75	-50.00	50.00	0.50	1.50
psa1	0.57	0.513	0.627	-10	10	0.90	1.10
psi1	0.33	0.297	0.363	-10	10	0.90	1.10
pcl1	0.1	0.09	0.11	-10	10	0.90	1.10
org1	0.0292	0.0258	0.0326	-11.76	11.76	0.88	1.12
psa2	0.7	0.63	0.77	-10	10	0.90	1.10
psi2	0.2	0.18	0.22	-10	10	0.90	1.10
pcl2	0.1	0.09	0.11	-10	10	0.90	1.10
org2	0.0138	0.0122	0.0154	-11.76	11.76	0.88	1.12
psa3	0.73	0.657	0.803	-10	10	0.90	1.10
psi3	0.16	0.144	0.176	-10	10	0.90	1.10
pcl3	0.11	0.099	0.121	-10	10	0.90	1.10
org3	0.0052	0.0046	0.0058	-11.76	11.76	0.88	1.12
psa4	0.77	0.693	0.847	-10	10	0.90	1.10
psi4	0.09	0.081	0.099	-10	10	0.90	1.10
pcl4	0.14	0.126	0.154	-10	10	0.90	1.10
org4	0.0034	0.0030	0.0038	-11.76	11.76	0.88	1.12
rds	80	60	100	-25.00	25.00	0.75	1.25
hi	-50	-71	-37	42.00	-26.00	1.42	0.74
temi	8	6	10	-25.00	25.00	0.75	1.25
if1	0.6	0.3	1.2	-50.00	100.00	0.5	2
ir1	0.75	0.375	1.5	-50.00	100.00	0.5	2
gctb	6.2	5.208	7.192	-16	16	0.84	1.16
cftb	0.75	0.5	1	-33.33	33.33	0.67	1.33
rdtb	80	60	100	-25.00	25.00	0.75	1.25
rdd	1	0.75	1	-25.00	0.00	0.75	1.00
bd1	1.35	1.215	1.485	-10	10	0.90	1.10
bd2	1.45	1.305	1.595	-10	10	0.90	1.10
bd3	1.41	1.269	1.551	-10	10	0.90	1.10
bd4	1.53	1.377	1.683	-10	10	0.90	1.10
leds	0.05	0.002	0.1	-96.00	100.00	0.04	2.00
thai	0.01	0.001	0.1	-90.00	900.00	0.10	10.00
suwa	3.97E-05	8.6149E-06	8.6308E-05	-78.3	117.4	0.22	2.17
suai	0.4303	0.21515	0.8606	-50.00	100.00	0.5	2
ensl	40000	20000	80000	-50.00	100.00	0.5	2
savp	3.00E-08	3E-09	0.0000003	-90	900	0.10	10.00
envp	100000	50000	200000	-50.00	100.00	0.5	2
cfup	0.5	0	1	-100.00	100.00	0.00	2.00
deg	23.26	11.63	46.52	-50.00	100.00	0.5	2
egcv	55000	41250	68750	-25.00	25.00	0.75	1.25
cfli	0.7	0.42	0.98	-40	40	0.60	1.40
kom	58.14	29.07	116.28	-50.00	100.00	0.5	2
freu	0.9	0.72	1.08	-20	20	0.80	1.20

Variation attributed to PESTLA input parameters
Pesticide T on Wick scenario

Variation of parameters (ALH)

Variations were attributed through the yellow cells

	Nominal values	Variation range					
		Absolute values		Percentage of variation		Multiplication factor	
		Lower	Upper	Lower	Upper	Lower	Upper
g11	0.0012	0.00108	0.00132	-10	10	0.90	1.10
g12	0.4476	0.40284	0.49236	-10	10	0.90	1.10
g13	98.12	24.53	392.48	-75	300	0.25	4.00
g14	0.0526	0.04997	0.05523	-5	5	0.95	1.05
g16	1.1395	1.082525	1.196475	-5	5	0.95	1.05
g21	0.0886	0.07974	0.09746	-10	10	0.90	1.10
g22	0.3778	0.34002	0.41558	-10	10	0.90	1.10
g23	37.34	9.335	149.36	-75	300	0.25	4.00
g24	0.0589	0.055955	0.061845	-5	5	0.95	1.05
g26	1.1574	1.09953	1.21527	-5	5	0.95	1.05
g31	0.1598	0.14382	0.17578	-10	10	0.90	1.10
g32	0.4029	0.36261	0.44319	-10	10	0.90	1.10
g33	51.94	12.985	207.76	-75	300	0.25	4.00
g34	0.048	0.0456	0.0504	-5	5	0.95	1.05
g36	1.2516	1.18902	1.31418	-5	5	0.95	1.05
g41	0	0	0	-10	10	0.00	0.00
g42	0.4285	0.38565	0.47135	-10	10	0.90	1.10
g43	39.31	9.8275	157.24	-75	300	0.25	4.00
g44	0.047	0.04465	0.04935	-5	5	0.95	1.05
g46	1.1113	1.055735	1.166865	-5	5	0.95	1.05
cofr	0.63	0.58	0.71	-7.94	12.70	0.92	1.13
rsig	0.5	0.25	0.75	-50.00	50.00	0.50	1.50
psa1	0.33	0.297	0.363	-10	10	0.90	1.10
psi1	0.48	0.432	0.528	-10	10	0.90	1.10
pcl1	0.19	0.171	0.209	-10	10	0.90	1.10
org1	0.0198	0.0175	0.0221	-11.76	11.76	0.88	1.12
psa2	0.42	0.378	0.462	-10	10	0.90	1.10
psi2	0.42	0.378	0.462	-10	10	0.90	1.10
pcl2	0.16	0.144	0.176	-10	10	0.90	1.10
org2	0.0083	0.0073	0.0093	-11.76	11.76	0.88	1.12
psa3	0.29	0.261	0.319	-10	10	0.90	1.10
psi3	0.48	0.432	0.528	-10	10	0.90	1.10
pcl3	0.23	0.207	0.253	-10	10	0.90	1.10
org3	0.0069	0.0061	0.0077	-11.76	11.76	0.88	1.12
psa4	0.26	0.234	0.286	-10	10	0.90	1.10
psi4	0.55	0.495	0.605	-10	10	0.90	1.10
pcl4	0.19	0.171	0.209	-10	10	0.90	1.10
org4	0.0052	0.0046	0.0058	-11.76	11.76	0.88	1.12
rds	80	60	100	-25.00	25.00	0.75	1.25
hi	-50	-141	-13.5	182.00	-73.00	2.82	0.27
temi	8	6	10	-25.00	25.00	0.75	1.25
if1	0.6	0.3	1.2	-50.00	100.00	0.5	2
ir1	0.75	0.375	1.5	-50.00	100.00	0.5	2
gctb	6.2	5.208	7.192	-16	16	0.84	1.16
cftb	0.75	0.5	1	-33.33	33.33	0.67	1.33
rdtb	80	60	100	-25.00	25.00	0.75	1.25
rdd	1	0.75	1	-25.00	0.00	0.75	1.00
bd1	1.39	1.251	1.529	-10	10	0.90	1.10
bd2	1.62	1.458	1.782	-10	10	0.90	1.10
bd3	1.55	1.395	1.705	-10	10	0.90	1.10
bd4	1.48	1.332	1.628	-10	10	0.90	1.10
leds	0.05	0.002	0.1	-96.00	100.00	0.04	2.00
thai	0.01	0.001	0.1	-90.00	900.00	0.10	10.00
suwa	3.97E-05	8.6149E-06	8.6308E-05	-78.3	117.4	0.22	2.17
suai	0.4303	0.21515	0.8606	-50.00	100.00	0.5	2
ensl	40000	20000	80000	-50.00	100.00	0.5	2
savp	0.003	0.0003	0.03	-90	900	0.10	10.00
envp	100000	50000	200000	-50.00	100.00	0.5	2
cfup	0.5	0	1	-100.00	100.00	0.00	2.00
deg	7.762	3.881	15.524	-50.00	100.00	0.5	2
egcv	55000	41250	68750	-25.00	25.00	0.75	1.25
cfli	0.7	0.42	0.98	-40	40	0.60	1.40
kom	11.628	5.814	23.256	-50.00	100.00	0.5	2
freu	0.9	0.72	1.08	-20	20	0.80	1.20

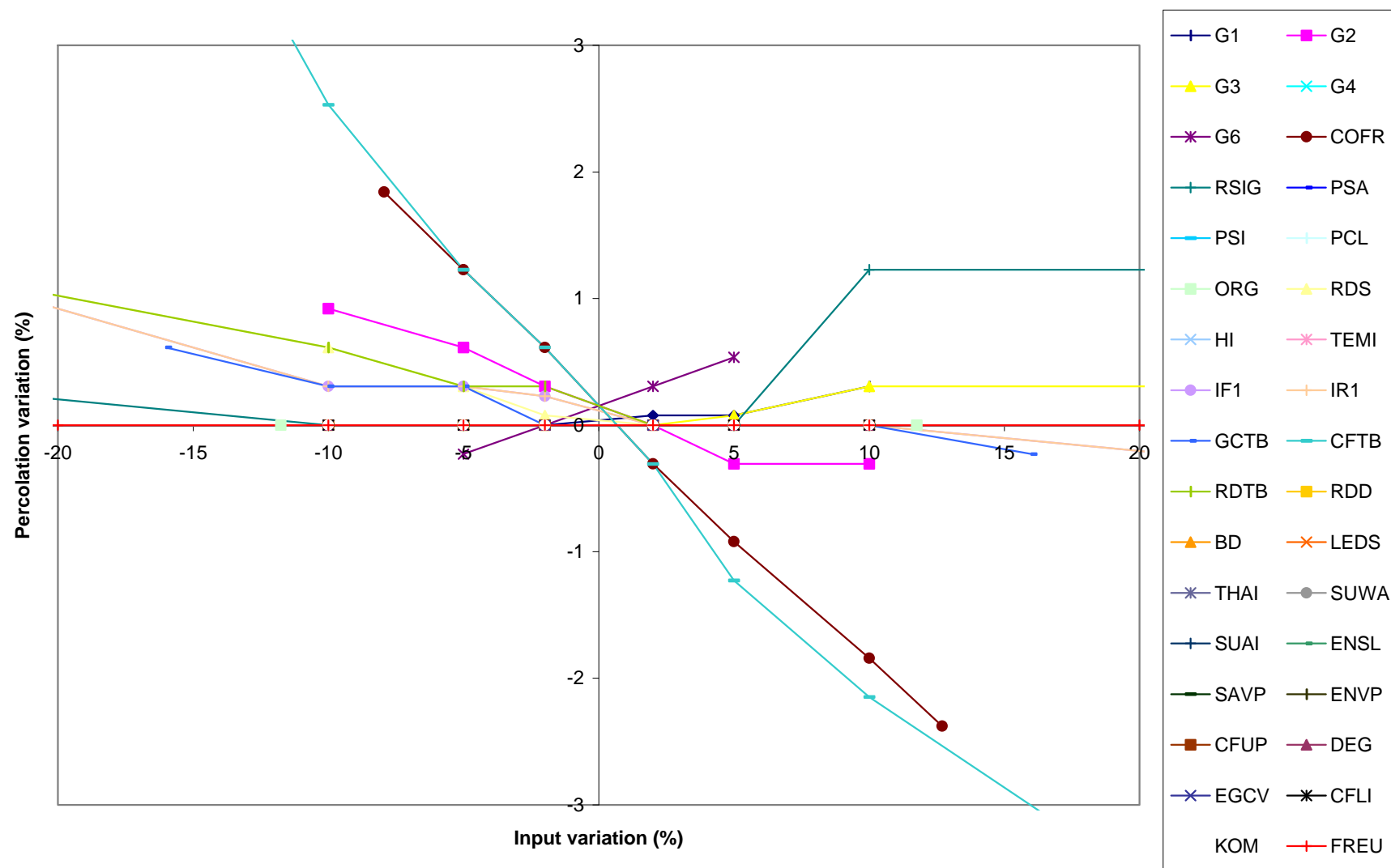
Variation attributed to PESTLA input parameters
Pesticide L on Hodnet scenario

Variation of parameters (ATH)

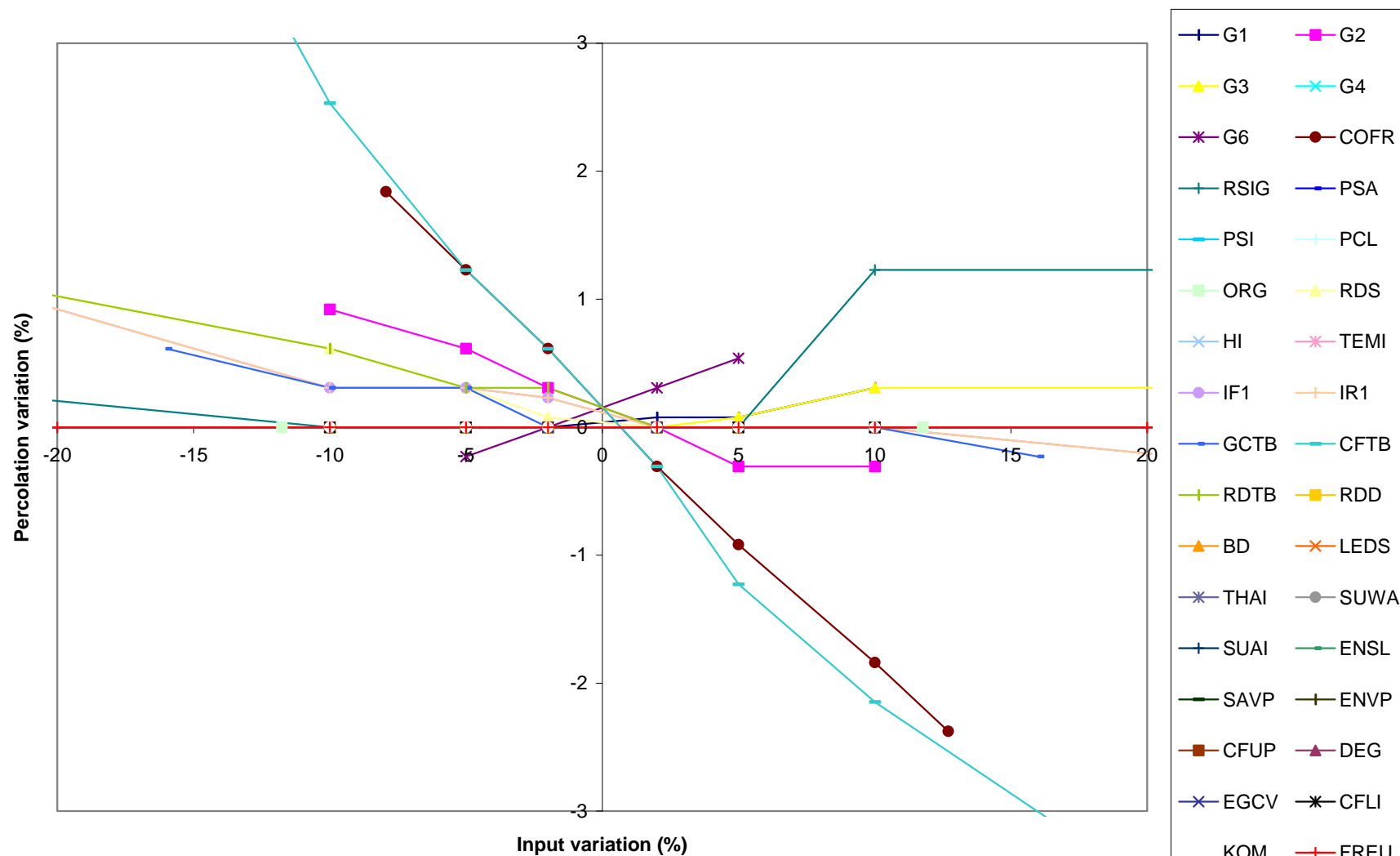
Variations were attributed through the yellow cells

	Nominal values	Variation range					
		Absolute		Percentage of variation		Multiplication factor	
		Lower	Upper	Lower	Upper	Lower	Upper
g11	0.0012	0.00108	0.00132	-10	10	0.90	1.10
g12	0.4476	0.40284	0.49236	-10	10	0.90	1.10
g13	98.12	24.53	392.48	-75	300	0.25	4.00
g14	0.0526	0.04997	0.05523	-5	5	0.95	1.05
g16	1.1395	1.082525	1.196475	-5	5	0.95	1.05
g21	0.0886	0.07974	0.09746	-10	10	0.90	1.10
g22	0.3778	0.34002	0.41558	-10	10	0.90	1.10
g23	37.34	9.335	149.36	-75	300	0.25	4.00
g24	0.0589	0.055955	0.061845	-5	5	0.95	1.05
g26	1.1574	1.09953	1.21527	-5	5	0.95	1.05
g31	0.1598	0.14382	0.17578	-10	10	0.90	1.10
g32	0.4029	0.36261	0.44319	-10	10	0.90	1.10
g33	51.94	12.985	207.76	-75	300	0.25	4.00
g34	0.048	0.0456	0.0504	-5	5	0.95	1.05
g36	1.2516	1.18902	1.31418	-5	5	0.95	1.05
g41	0	0	0	-10	10	0.00	0.00
g42	0.4285	0.38565	0.47135	-10	10	0.90	1.10
g43	39.31	9.8275	157.24	-75	300	0.25	4.00
g44	0.047	0.04465	0.04935	-5	5	0.95	1.05
g46	1.1113	1.055735	1.166865	-5	5	0.95	1.05
cofr	0.63	0.58	0.71	-7.94	12.70	0.92	1.13
rsig	0.5	0.25	0.75	-50.00	50.00	0.50	1.50
psa1	0.33	0.297	0.363	-10	10	0.90	1.10
psi1	0.48	0.432	0.528	-10	10	0.90	1.10
pcl1	0.19	0.171	0.209	-10	10	0.90	1.10
org1	0.0198	0.0175	0.0221	-11.76	11.76	0.88	1.12
psa2	0.42	0.378	0.462	-10	10	0.90	1.10
psi2	0.42	0.378	0.462	-10	10	0.90	1.10
pcl2	0.16	0.144	0.176	-10	10	0.90	1.10
org2	0.0083	0.0073	0.0093	-11.76	11.76	0.88	1.12
psa3	0.29	0.261	0.319	-10	10	0.90	1.10
psi3	0.48	0.432	0.528	-10	10	0.90	1.10
pcl3	0.23	0.207	0.253	-10	10	0.90	1.10
org3	0.0069	0.0061	0.0077	-11.76	11.76	0.88	1.12
psa4	0.26	0.234	0.286	-10	10	0.90	1.10
psi4	0.55	0.495	0.605	-10	10	0.90	1.10
pcl4	0.19	0.171	0.209	-10	10	0.90	1.10
org4	0.0052	0.0046	0.0058	-11.76	11.76	0.88	1.12
rds	80	60	100	-25.00	25.00	0.75	1.25
hi	-50	-141	-13.5	182.00	-73.00	2.82	0.27
temi	8	6	10	-25.00	25.00	0.75	1.25
if1	0.6	0.3	1.2	-50.00	100.00	0.5	2
ir1	0.75	0.375	1.5	-50.00	100.00	0.5	2
gctb	6.2	5.208	7.192	-16	16	0.84	1.16
cftb	0.75	0.5	1	-33.33	33.33	0.67	1.33
rdtb	80	60	100	-25.00	25.00	0.75	1.25
rdd	1	0.75	1	-25.00	0.00	0.75	1.00
bd1	1.39	1.251	1.529	-10	10	0.90	1.10
bd2	1.62	1.458	1.782	-10	10	0.90	1.10
bd3	1.55	1.395	1.705	-10	10	0.90	1.10
bd4	1.48	1.332	1.628	-10	10	0.90	1.10
leds	0.05	0.002	0.1	-96.00	100.00	0.04	2.00
thai	0.01	0.001	0.1	-90.00	900.00	0.10	10.00
suwa	3.97E-05	8.61E-06	8.63E-05	-78.3	117.4	0.22	2.17
suai	0.4303	0.21515	0.8606	-50.00	100.00	0.5	2
ensl	40000	20000	80000	-50.00	100.00	0.5	2
savp	3.00E-08	3E-09	3E-07	-90	900	0.10	10.00
envp	100000	50000	200000	-50.00	100.00	0.5	2
cfup	0.5	0	1	-100.00	100.00	0.00	2.00
deg	23.26	11.63	46.52	-50.00	100.00	0.5	2
egcv	55000	41250	68750	-25.00	25.00	0.75	1.25
cflj	0.7	0.42	0.98	-40	40	0.60	1.40
kom	58.14	29.07	116.28	-50.00	100.00	0.5	2
freu	0.9	0.72	1.08	-20	20	0.80	1.20

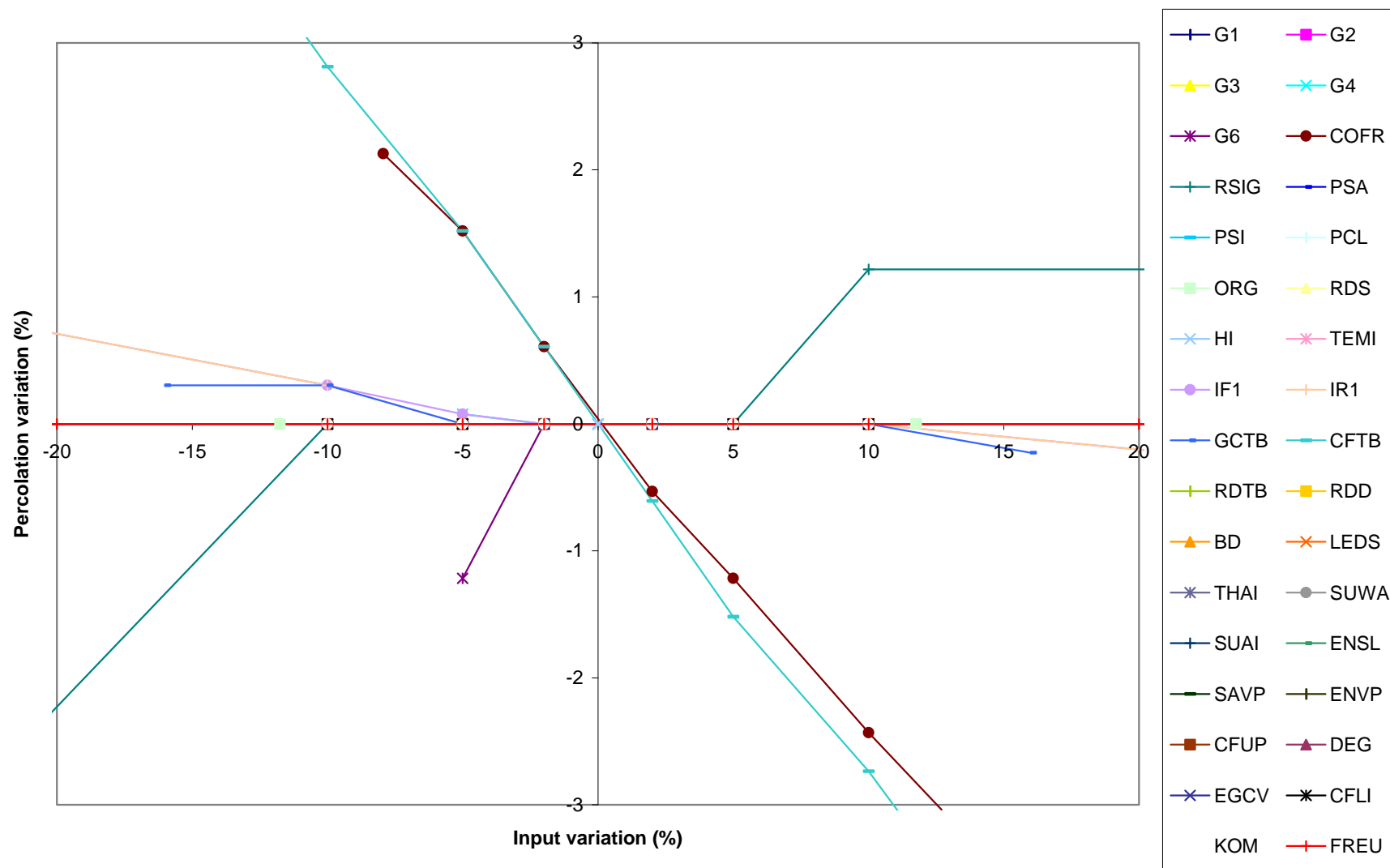
Variation attributed to PESTLA input parameters
Pesticide T on Hodnet scenario



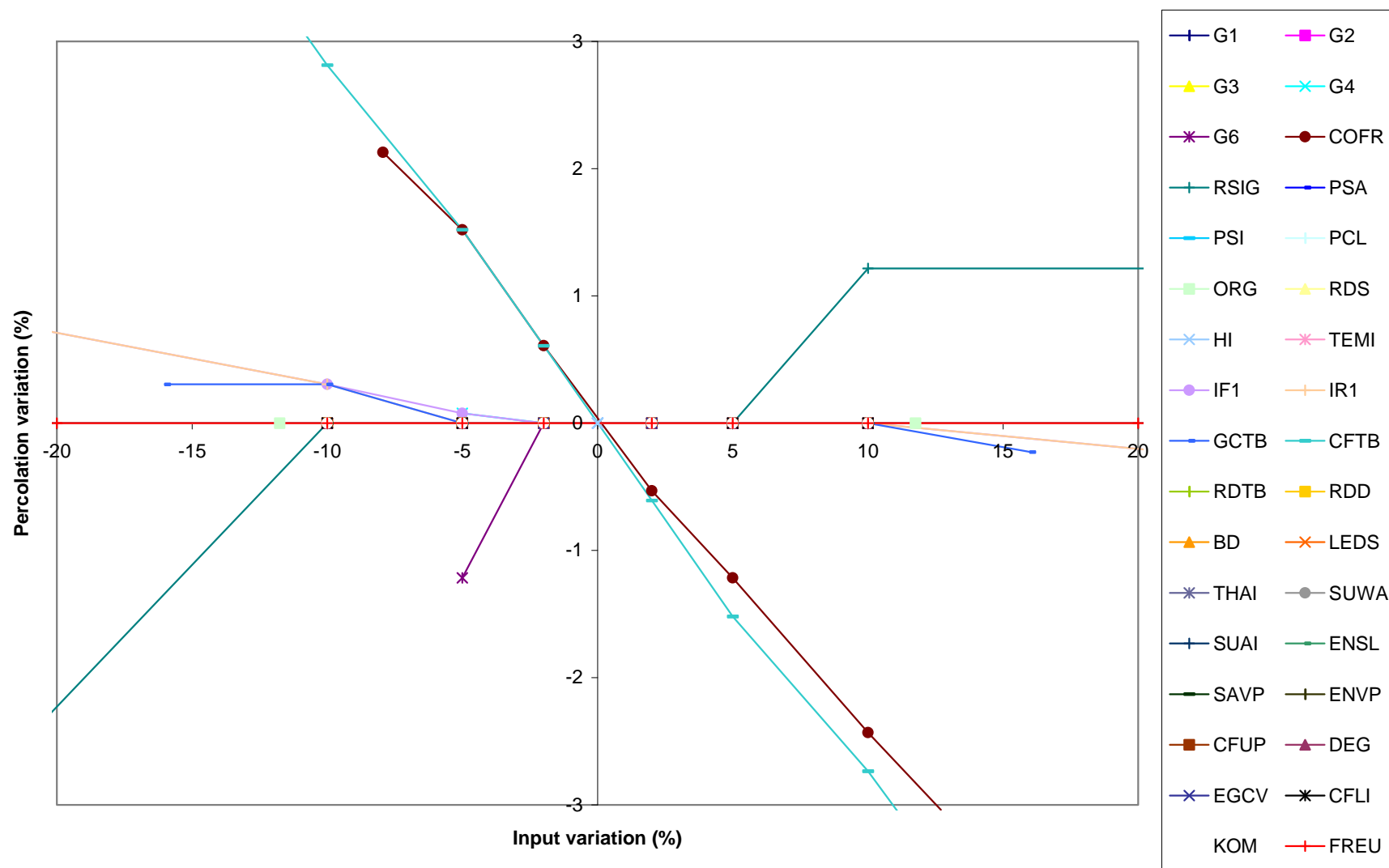
Influence of the variation of input parameters on percolation predicted by PESTLA
Pesticide L on Wick scenario



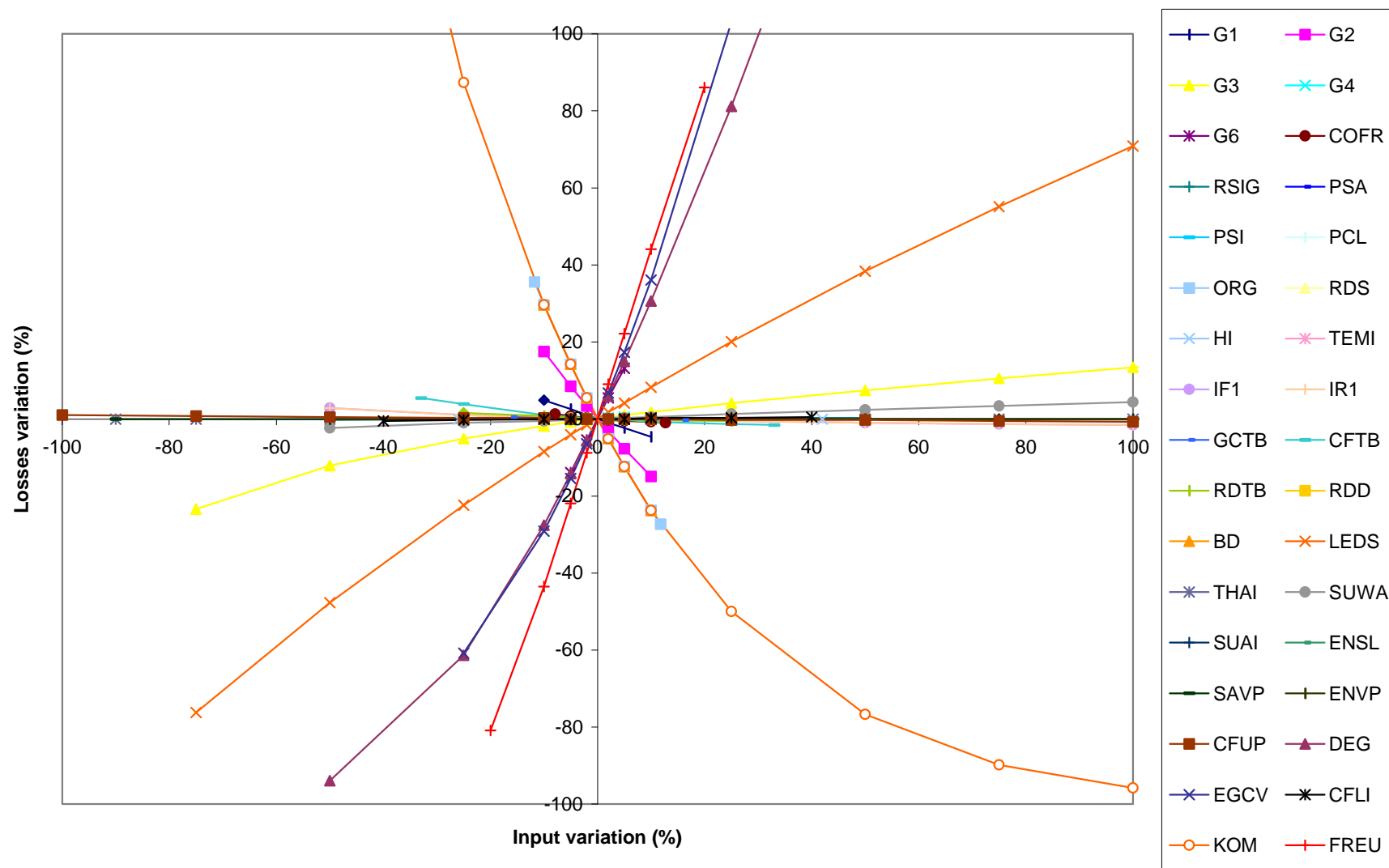
Influence of the variation of input parameters on percolation predicted by PESTLA
Pesticide T on Wick scenario



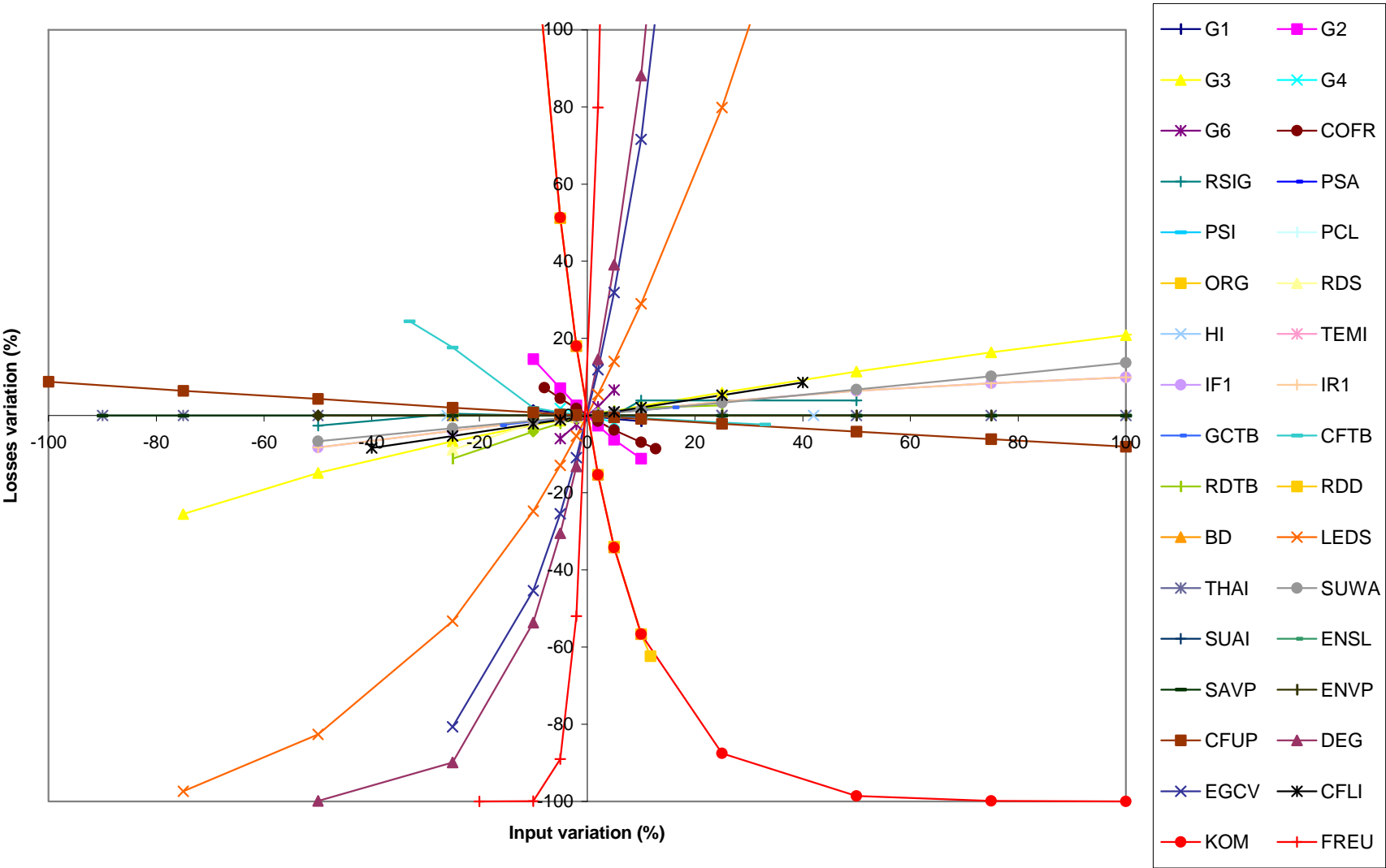
Influence of the variation of input parameters on percolation predicted by PESTLA
Pesticide L on Hodnet scenario



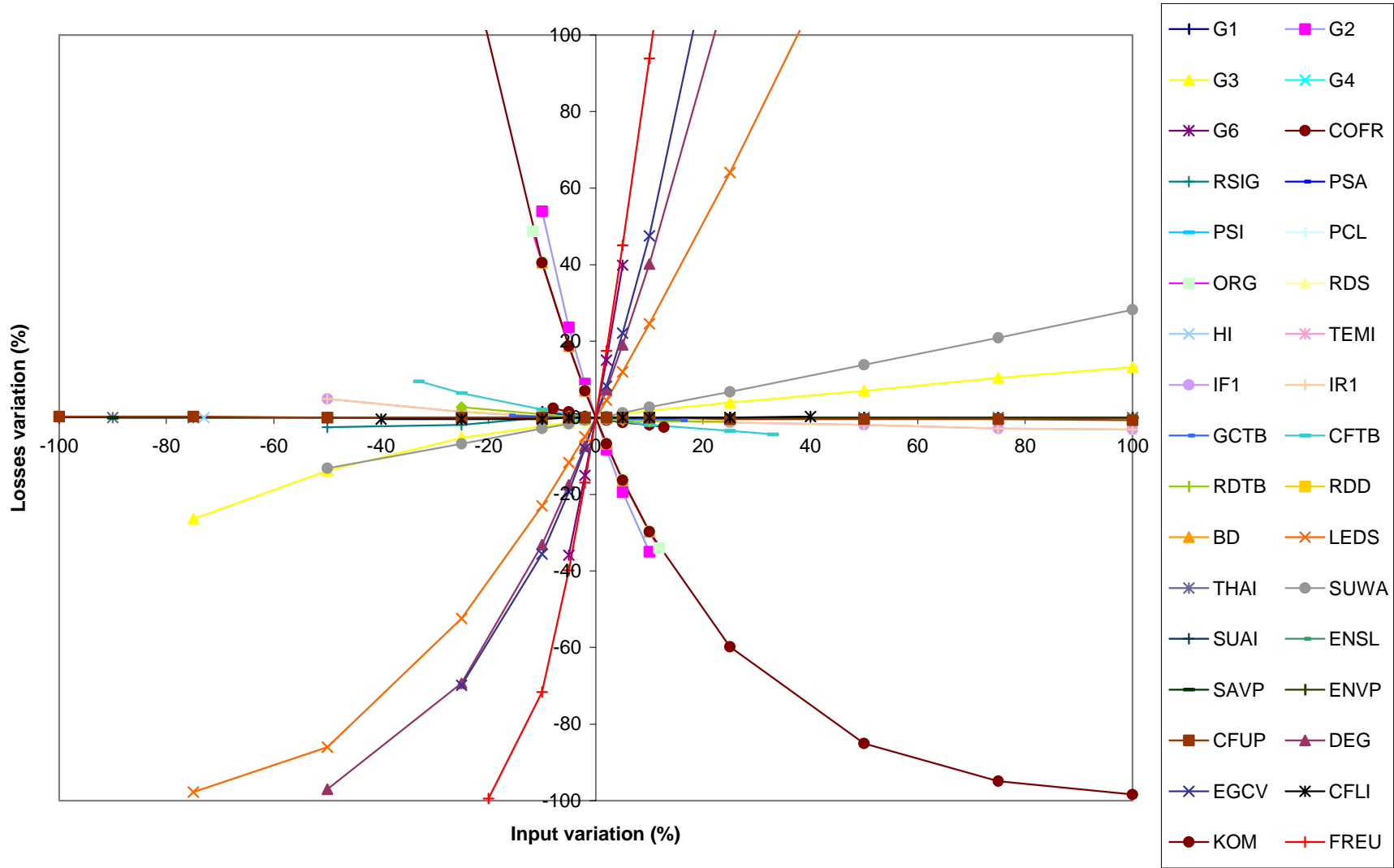
Influence of the variation of input parameters on percolation predicted by PESTLA
Pesticide T on Hodnet scenario



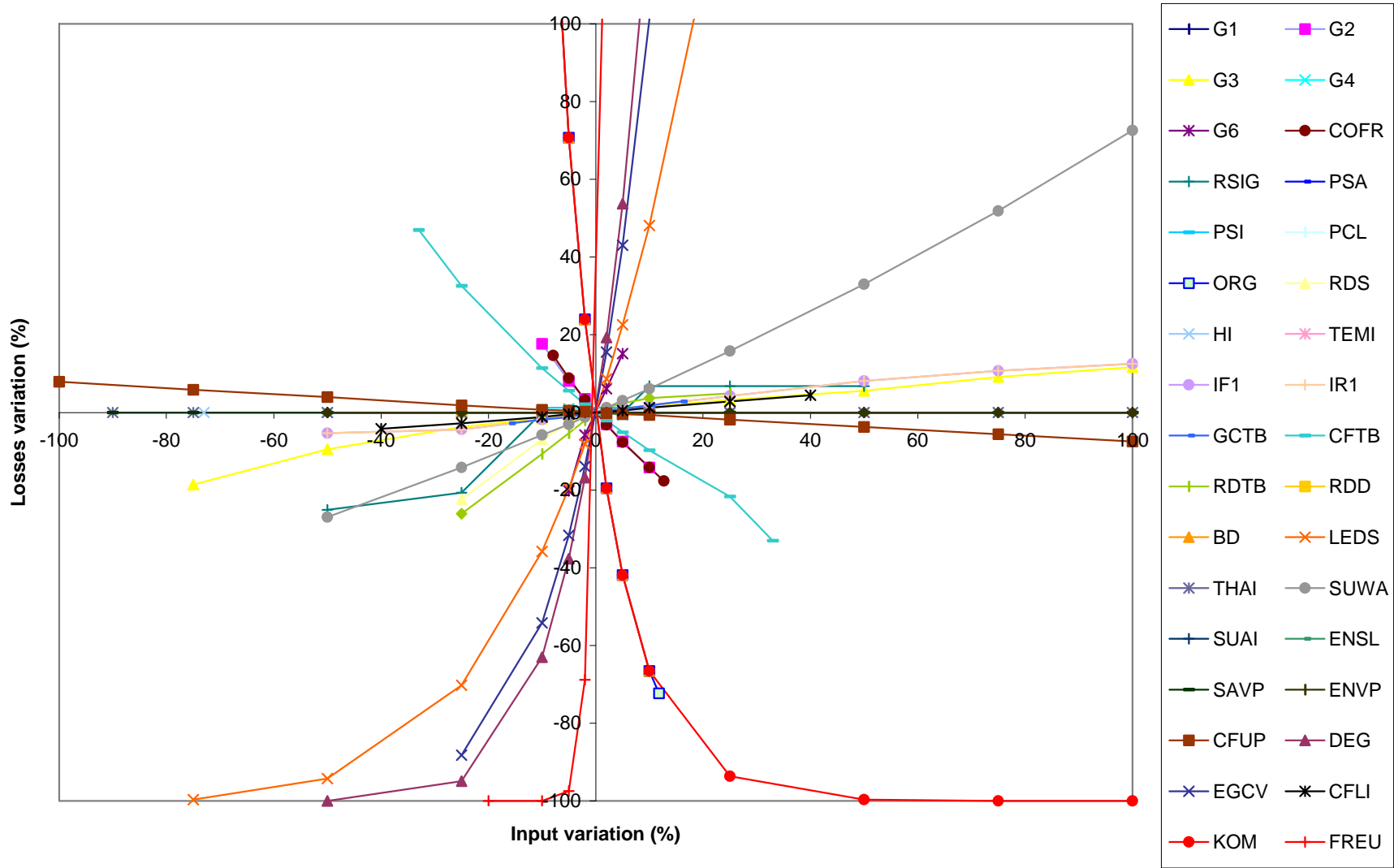
Influence of the variation of input parameters on pesticide losses predicted by PESTLA
Pesticide L on Wick scenario



Influence of the variation of input parameters on pesticide losses predicted by PESTLA
Pesticide T on Wick scenario



Influence of the variation of input parameters on pesticide losses predicted by PESTLA
Pesticide L on Hodnet scenario








Influence of the variation of input parameters on pesticide losses predicted by PESTLA
Pesticide T on Hodnet scenario

		Wick		Hodnet		Influence
		Pesticide L	Pesticide T	Pesticide L	Pesticide T	
CFTB	Crop factor	0.331	0.331	0.332	0.332	-
COFR	Soil evaporation coefficient of Blak and Boesten or Boesten/Stroosnijder	0.307	0.307	0.304	0.304	-
G6	Parameter n	0.153	0.153	0.243	0.243	+
RSIG	Minimum rainfall to reset models	0.123	0.123	0.134	0.134	+/-
IF1	Extinction coefficient for diffuse visible light	0.115	0.115	0.061	0.061	-
IR1	Extinction coefficient for direct visible light	0.115	0.115	0.061	0.061	-
G2	Saturated moisture content	0.153	0.153	0	0	-
RDTB	maximum rooting depth	0.153	0.153	0	0	-
GCTB	Maximum leaf area index	0.061	0.061	0.030	0.030	-
RDS	maximum rooting depth allowed by soil profile	0.061	0.061	0	0	-
G1	Residual moisture content	0.038	0.038	0	0	+
G3	Saturated hydraulic conductivity	0.031	0.031	0.004	0.004	+
G4	Alpha main drying curve	0	0	0.015	0.015	-
PSA	sand content	0	0	0	0	
PSI	silt content	0	0	0	0	
PCL	clay content	0	0	0	0	
ORG	organic matter content	0	0	0	0	
HI	initial pressure heads	0	0	0	0	
TEMI	initial soil temperatures	0	0	0	0	
RDD	Root density distribution	0	0	0	0	
BD	Bulk density	0	0	0	0	
LEDS	Lengths of dispersion in liquid phase	0	0	0	0	
THAI	Thickness of the stagnant air layer at soil surface	0	0	0	0	
SUWA	Coefficient of diffusion in water	0	0	0	0	
SUAI	Coefficient of diffusion in air	0	0	0	0	
ENSL	Molar enthalpy of the dissolution process	0	0	0	0	
SAVP	Saturated vapour pressure	0	0	0	0	
ENVP	Molar enthalpy of the vaporisation process	0	0	0	0	
CFUP	Coefficient of uptake by plants	0	0	0	0	
DEG	Half life	0	0	0	0	
EGCV	Molar activation energy of degradation	0	0	0	0	
CFLI	Coefficient describing the relationship between the conversion rate and the volume fraction of liquid	0	0	0	0	
KOM	Kom	0	0	0	0	
FREU	Freundlich exponent	0	0	0	0	

**Classification of PESTLA parameters according to their influence on percolation
(values presented are MAROV)**

A positive influence means that an increase in the value of the parameter will result in an increase in percolation and vice versa

The shades of grey represent a classification of parameters into sensitivity classes as follows:






	Extremely sensitive		Slightly sensitive
	Very sensitive		Insensitive
	Moderately sensitive		

		Wick		Hodnet		Influence
		Pesticide L	Pesticide T	Pesticide L	Pesticide T	
FREU	Freundlich exponent	4.5	107.2	9.7	357.8	+
KOM	Kom	4.6	81.8	7.7	190.1	-
DEG	Half life	3.8	34.6	7.8	112.7	+
ORG	organic matter content	3.0	13.8	4.1	20.8	-
BD	Bulk density	3.0	12.8	4.0	18.8	-
EGCV	Molar activation energy of degradation	4.1	10.0	5.8	16.2	+
LEDS	Lengths of dispersion in liquid phase	1.0	4.3	2.9	10.4	+
G6	Parameter n	2.8	1.3	8.0	4.0	+
G2	Saturated moisture content	1.8	1.5	5.4	1.8	-
COFR	Soil evaporation coefficient of Blak and Boesten or Boesten/Stroosnijder	0.162	0.914	0.309	1.8	-
CFTB	Crop factor	0.164	0.740	0.288	1.4	-
RDTB	maximum rooting depth	0.129	0.449	0.153	1.1	+/-
RDS	maximum rooting depth allowed by soil profile	0.052	0.356	0.074	0.893	+/-
SUWA	Coefficient of diffusion in water	0.129	0.165	0.307	0.749	+
RSIG	Minimum rainfall to reset models	0.026	0.396	0.074	0.828	+/-
G3	Saturated hydraulic conductivity	0.313	0.341	0.352	0.248	+
G1	Residual moisture content	0.515	0.165	0.184	0.093	-
G4	Alpha main drying curve	0.129	0.413	0.153	0.186	+/-
IF1	Extinction coefficient for diffuse visible light	0.057	0.248	0.153	0.233	+/-
IR1	Extinction coefficient for direct visible light	0.057	0.248	0.153	0.233	+/-
GCTB	Maximum leaf area index	0.052	0.165	0.153	0.233	+/-
PSI	silt content	0	0	0	0.581	+/-
CFLI	Coefficient describing the relationship between the conversion rate and the volume fraction of liquid	0.026	0.231	0.031	0.116	+
CFUP	Coefficient of uptake by plants	0.026	0.099	0.012	0.116	-
PSA	sand content	0	0.033	0	0.116	+/-
PCL	clay content	0	0.017	0	0.116	+/-
HI	initial pressure heads	0	0	0	0	
TEMI	initial soil temperatures	0	0	0	0	
RDD	Root density distribution	0	0	0	0	
THAI	Thickness of the stagnant air layer at soil surface	0	0	0	0	
SUAI	Coefficient of diffusion in air	0	0	0	0	
ENSL	Molar enthalpy of the dissolution process	0	0	0	0	
SAVP	Saturated vapour pressure	0	0	0	0	
ENVP	Molar enthalpy of the vaporisation process	0	0	0	0	

Classification of PESTLA parameters according to their influence on pesticide losses (values presented are MAROV)

A positive influence means that an increase in the value of the parameter will result in an increase in pesticide losses and vice versa

The shades of grey represent a classification of parameters into sensitivity classes as follows:

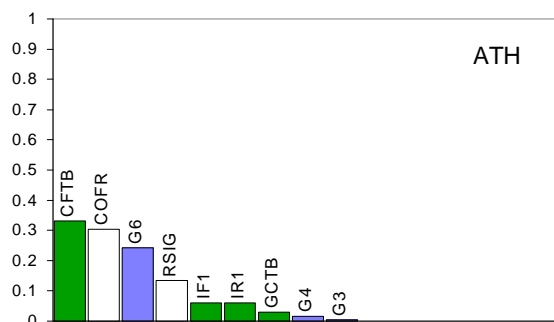
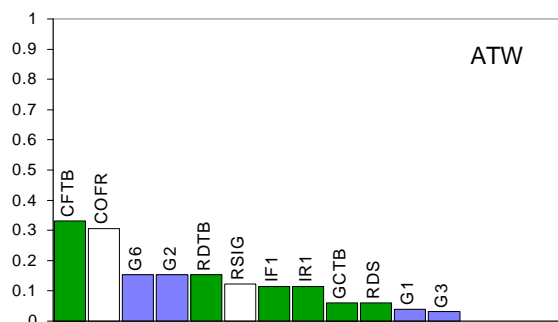
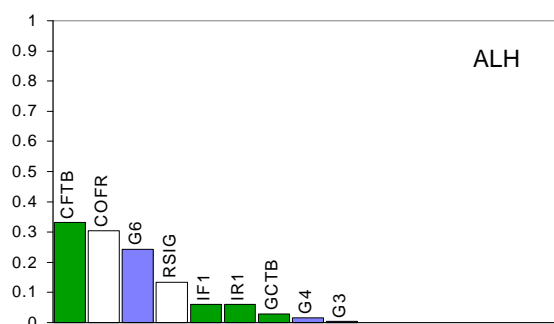
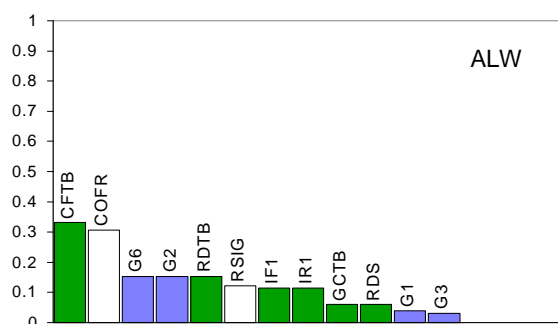
	Extremely sensitive		Slightly sensitive
	Very sensitive		Insensitive
	Moderately sensitive		

	ALW		ATW		ALH		ATH	
1	CFTB	0.331	CFTB	0.331	CFTB	0.332	CFTB	0.332
2	COFR	0.307	COFR	0.307	COFR	0.304	COFR	0.304
3	G6	0.153	G6	0.153	G6	0.243	G6	0.243
4	G2	0.153	G2	0.153	RSIG	0.134	RSIG	0.134
5	RDTB	0.153	RDTB	0.153	IF1	0.061	IF1	0.061
6	RSIG	0.123	RSIG	0.123	IR1	0.061	IR1	0.061
7	IF1	0.115	IF1	0.115	GCTB	0.03	GCTB	0.03
8	IR1	0.115	IR1	0.115	G4	0.015	G4	0.015
9	GCTB	0.061	GCTB	0.061	G3	0.004	G3	0.004
10	RDS	0.061	RDS	0.061	G2	0	G2	0
11	G1	0.038	G1	0.038	RDTB	0	RDTB	0
12	G3	0.031	G3	0.031	RDS	0	RDS	0
13	G4	0	G4	0	G1	0	G1	0
14	PSA	0	PSA	0	PSA	0	PSA	0
15	PSI	0	PSI	0	PSI	0	PSI	0

**The 15 most influential parameters on the prediction of percolation
by PESTLA for the four scenarios (classification by MAROV values).**

	ALW		ATW		ALH		ATH	
1	KOM	4.6	FREU	107.2	FREU	9.7	FREU	357.8
2	FREU	4.5	KOM	81.8	G6	8.0	KOM	190.1
3	EGCV	4.1	DEG	34.6	DEG	7.8	DEG	112.7
4	DEG	3.8	ORG	13.8	KOM	7.7	ORG	20.8
5	ORG	3.0	BD	12.8	EGCV	5.8	BD	18.8
6	BD	3.0	EGCV	10.0	G2	5.4	EGCV	16.2
7	G6	2.8	LEDS	4.3	ORG	4.1	LEDS	10.4
8	G2	1.8	G2	1.5	BD	4.0	G6	4.0
9	LEDS	1.0	G6	1.3	LEDS	2.9	COFR	1.8
10	G1	0.515	COFR	0.914	G3	0.352	G2	1.8
11	G3	0.313	CFTB	0.740	COFR	0.309	CFTB	1.4
12	CFTB	0.164	RDTB	0.449	SUWA	0.307	RDTB	1.1
13	COFR	0.162	G4	0.413	CFTB	0.288	RDS	0.893
14	RDTB	0.129	RSIG	0.396	G1	0.184	RSIG	0.828
15	SUWA	0.129	RDS	0.356	RDTB	0.153	SUWA	0.749

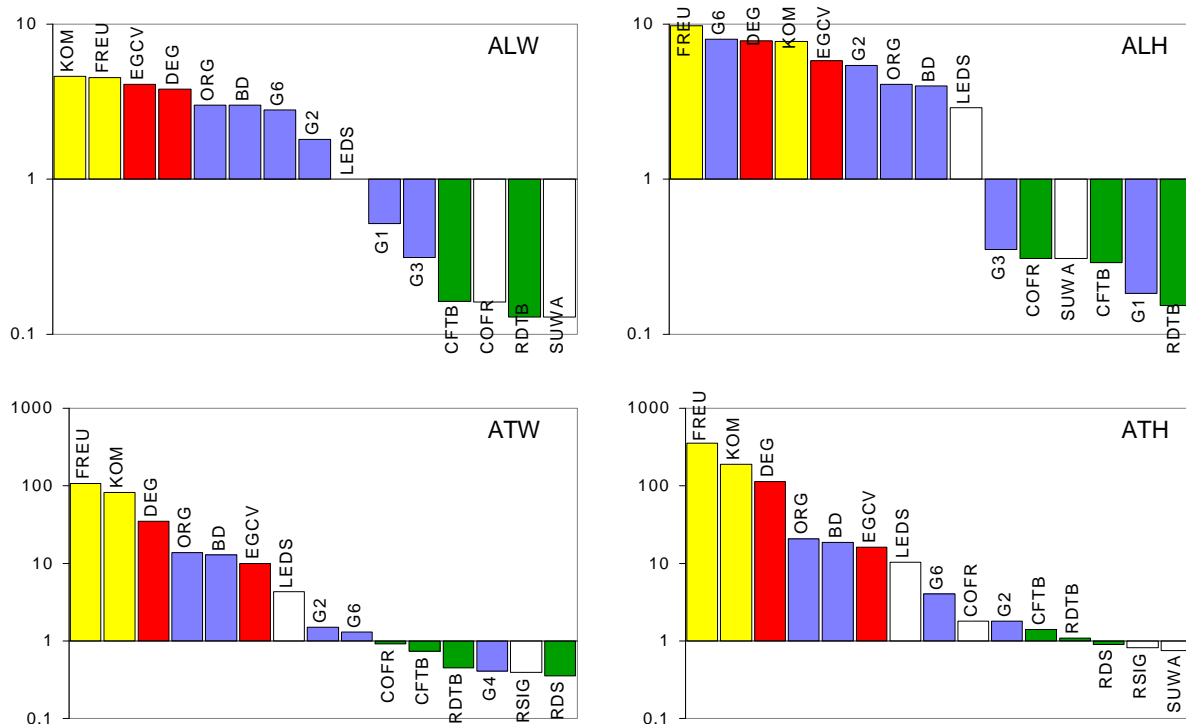
**The 15 most influential parameters on the prediction of pesticide losses
by PESTLA for the four scenarios (classification by MAROV values).**



Sensitivity of percolation predicted by PESTLA

Parameters have been classified into categories as follows





Sensitivity of pesticide losses predicted by PESTLA

The 15 most influential parameters have been classified into categories as follows

