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Appendices to the report

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

SSLRC

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by

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

Final report
September 2000

MAFF Project PL0532
SSLRC Contract No. JF 3741E

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Foreword

In 1998, the Ministry of Agriculture, Fisheries and Food (MAFF) commissioned SSLRC to undertake sensitivity analyses for the leaching models used for pesticide registration in Europe. A first document provides a description of the methods which were adopted for these investigations, a presentation of results obtained and implications of the findings for modelling activities and submission of modelling studies for pesticide registration. This second document gathers appendices providing detailed information on investigation methods and results.

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 - Appendices. SSLRC report for MAFF PL0532, Silsoe, Beds., UK, 238p.

The two others documents which were produced within the scope of this project are referenced as follows:
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 – A quick reference guide. SSLRC report for MAFF PL0532, Silsoe, Beds., UK, 82p.

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.

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Appendices for MACRO

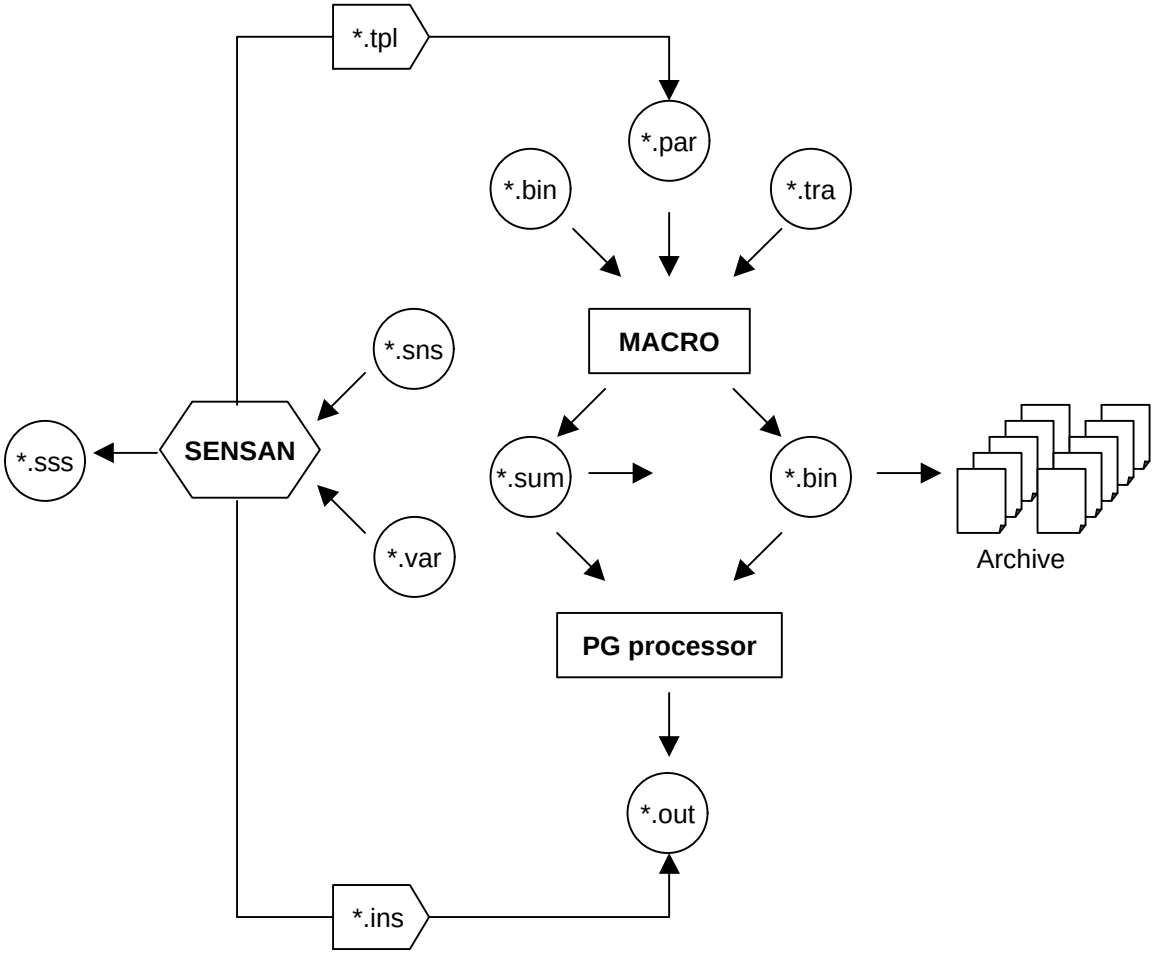
Appendix 1. Example of input file for MACRO (Pesticide L on Wick scenario)

```
# ------------------------------------------------------------------------------
# MLW.PAR Tue Jan 05 09:45:00 1999
# ------------------------------------------------------------------------------
# ------------------------------------------------------------------------------
# Switches
# ------------------------------------------------------------------------------
  Averagex             2   Boundary             1   Chapar              ON
  Colloid            OFF   Crop                 2   Driving              0
  Evaporate            1   Initial              2   Irrigate             1
  Lisallv              1   Massunits            2   Metabolite         OFF
  Rainfall             1   Solute               2   Tiledrain            2
  Validpg              0
# ------------------------------------------------------------------------------
# Parameters
# ------------------------------------------------------------------------------

# Soil Profile ----------------------------------------------------------------

  NLAYER              15   Z(1)                30   Z(2)                40
  Z(3)                40   Z(4)                40   Z(5)                50
  Z(6)                60   Z(7)                80   Z(8)                80
  Z(9)                80   Z(10)               80   Z(11)               80
  Z(12)               90   Z(13)               80   Z(14)               80
  Z(15)               90

# Site ------------------------------------------------------------------------

  ANNAMP          8.0000   ANNTAV          8.0000   PHI                 52
  RAINCO               1   RINTEN          2.0000   SNOWCO               1
  SNOWMF             4.5

# Initial/Boundary conditions -------------------------------------------------

  BGRAD                1   SOLINIT(1)           0   SOLINIT(2)           0
  SOLINIT(3)           0   SOLINIT(4)           0   SOLINIT(5)           0
  SOLINIT(6)           0   SOLINIT(7)           0   SOLINIT(8)           0
  SOLINIT(9)           0   SOLINIT(10)          0   SOLINIT(11)          0
  SOLINIT(12)          0   SOLINIT(13)          0   SOLINIT(14)          0
  SOLINIT(15)          0   TEMPINI(1)      8.0000   TEMPINI(2)      8.0000
  TEMPINI(3)      8.0000   TEMPINI(4)      8.0000   TEMPINI(5)      8.0000
  TEMPINI(6)      8.0000   TEMPINI(7)      8.0000   TEMPINI(8)      8.0000
  TEMPINI(9)      8.0000   TEMPINI(10)     8.0000   TEMPINI(11)     8.0000
  TEMPINI(12)     8.0000   TEMPINI(13)     8.0000   TEMPINI(14)     8.0000
  TEMPINI(15)     8.0000   THETAINI(1)     27.750   THETAINI(2)     27.750
  THETAINI(3)     27.750   THETAINI(4)     27.750   THETAINI(5)     27.750
  THETAINI(6)     19.130   THETAINI(7)     19.130   THETAINI(8)     19.130
  THETAINI(9)     19.130   THETAINI(10)    14.690   THETAINI(11)    14.690
  THETAINI(12)    14.690   THETAINI(13)    19.230   THETAINI(14)    19.230
  THETAINI(15)    19.230

# Solute transport ------------------------------------------------------------

  AEXC(1)              0   AEXC(2)              0   AEXC(3)              0
  AEXC(4)              0   AEXC(5)              0   AEXC(6)              0
  AEXC(7)              0   AEXC(8)              0   AEXC(9)              0
  AEXC(10)             0   AEXC(11)             0   AEXC(12)             0
  AEXC(13)             0   AEXC(14)             0   AEXC(15)             0
  CONC                 0   DIFF            .46e-9   DV              1.0000
  FSTAR                0   ZMIX            1.0000

# Pesticide -------------------------------------------------------------------

  CANDEG          .08930   DEGMAL(1)       .08930   DEGMAL(2)       .08930
  DEGMAL(3)       .08930   DEGMAL(4)       .08930   DEGMAL(5)       .08930
  DEGMAL(6)       .05040   DEGMAL(7)       .05040   DEGMAL(8)       .05040
  DEGMAL(9)       .05040   DEGMAL(10)      .02650   DEGMAL(11)      .02650
  DEGMAL(12)      .02650   DEGMAL(13)      .02110   DEGMAL(14)      .02110
  DEGMAL(15)      .02110   DEGMAS(1)       .08930   DEGMAS(2)       .08930
  DEGMAS(3)       .08930   DEGMAS(4)       .08930   DEGMAS(5)       .08930
  DEGMAS(6)       .05040   DEGMAS(7)       .05040   DEGMAS(8)       .05040
  DEGMAS(9)       .05040   DEGMAS(10)      .02650   DEGMAS(11)      .02650
  DEGMAS(12)      .02650   DEGMAS(13)      .02110   DEGMAS(14)      .02110
  DEGMAS(15)      .02110   DEGMIL(1)       .08930   DEGMIL(2)       .08930
  DEGMIL(3)       .08930   DEGMIL(4)       .08930   DEGMIL(5)       .08930
```

```
  DEGMIL(6)        .05040   DEGMIL(7)        .05040   DEGMIL(8)        .05040
  DEGMIL(9)        .05040   DEGMIL(10)       .02650   DEGMIL(11)       .02650
  DEGMIL(12)       .02650   DEGMIL(13)       .02110   DEGMIL(14)       .02110
  DEGMIL(15)       .02110   DEGMIS(1)        .08930   DEGMIS(2)        .08930
  DEGMIS(3)        .08930   DEGMIS(4)        .08930   DEGMIS(5)        .08930
  DEGMIS(6)        .05040   DEGMIS(7)        .05040   DEGMIS(8)        .05040
  DEGMIS(9)        .05040   DEGMIS(10)       .02650   DEGMIS(11)       .02650
  DEGMIS(12)       .02650   DEGMIS(13)       .02110   DEGMIS(14)       .02110
  DEGMIS(15)       .02110   EXPB             .70000   FEXT             .01000
  FRACMAC          .02000   FREUND           .90000   TREF                 20
  TRESP            .08000   ZKD(1)           .34000   ZKD(2)           .34000
  ZKD(3)           .34000   ZKD(4)           .34000   ZKD(5)           .34000
  ZKD(6)           .16000   ZKD(7)           .16000   ZKD(8)           .16000
  ZKD(9)           .16000   ZKD(10)          .06000   ZKD(11)          .06000
  ZKD(12)          .06000   ZKD(13)          .04000   ZKD(14)          .04000
  ZKD(15)          .04000

# Physical/Hydraulic properties ----------------------------------------------

  ASCALE(1)       20.000   ASCALE(2)       20.000   ASCALE(3)       20.000
  ASCALE(4)       20.000   ASCALE(5)       20.000   ASCALE(6)       15.000
  ASCALE(7)       15.000   ASCALE(8)       15.000   ASCALE(9)       15.000
  ASCALE(10)      25.000   ASCALE(11)      25.000   ASCALE(12)      25.000
  ASCALE(13)      10.000   ASCALE(14)      10.000   ASCALE(15)      10.000
  CTEN(1)         10.000   CTEN(2)         10.000   CTEN(3)         10.000
  CTEN(4)         10.000   CTEN(5)         10.000   CTEN(6)         10.000
  CTEN(7)         10.000   CTEN(8)         10.000   CTEN(9)         10.000
  CTEN(10)        10.000   CTEN(11)        10.000   CTEN(12)        10.000
  CTEN(13)        10.000   CTEN(14)        10.000   CTEN(15)        10.000
  GAMMA(1)        1.3500   GAMMA(2)        1.3500   GAMMA(3)        1.3500
  GAMMA(4)        1.3500   GAMMA(5)        1.3500   GAMMA(6)        1.4500
  GAMMA(7)        1.4500   GAMMA(8)        1.4500   GAMMA(9)        1.4500
  GAMMA(10)       1.4100   GAMMA(11)       1.4100   GAMMA(12)       1.4100
  GAMMA(13)       1.5300   GAMMA(14)       1.5300   GAMMA(15)       1.5300
  KSATMIN(1)      120.00   KSATMIN(2)      120.00   KSATMIN(3)      120.00
  KSATMIN(4)      120.00   KSATMIN(5)      120.00   KSATMIN(6)      150.00
  KSATMIN(7)      150.00   KSATMIN(8)      150.00   KSATMIN(9)      150.00
  KSATMIN(10)     225.00   KSATMIN(11)     225.00   KSATMIN(12)     225.00
  KSATMIN(13)     70.000   KSATMIN(14)     70.000   KSATMIN(15)     70.000
  KSM(1)          .49200   KSM(2)          .49200   KSM(3)          .49200
  KSM(4)          .49200   KSM(5)          .49200   KSM(6)          .31300
  KSM(7)          .31300   KSM(8)          .31300   KSM(9)          .31300
  KSM(10)         .42600   KSM(11)         .42600   KSM(12)         .42600
  KSM(13)         .37900   KSM(14)         .37900   KSM(15)         .37900
  RESID(1)             0   RESID(2)             0   RESID(3)             0
  RESID(4)             0   RESID(5)             0   RESID(6)             0
  RESID(7)             0   RESID(8)             0   RESID(9)             0
  RESID(10)            0   RESID(11)            0   RESID(12)            0
  RESID(13)            0   RESID(14)            0   RESID(15)            0
  TPORV(1)        46.560   TPORV(2)        46.560   TPORV(3)        46.560
  TPORV(4)        46.560   TPORV(5)        46.560   TPORV(6)        39.600
  TPORV(7)        39.600   TPORV(8)        39.600   TPORV(9)        39.600
  TPORV(10)       39.010   TPORV(11)       39.010   TPORV(12)       39.010
  TPORV(13)       34.340   TPORV(14)       34.340   TPORV(15)       34.340
  WILT(1)         10.540   WILT(2)         10.540   WILT(3)         10.540
  WILT(4)         10.540   WILT(5)         10.540   WILT(6)         7.9400
  WILT(7)         7.9400   WILT(8)         7.9400   WILT(9)         7.9400
  WILT(10)        4.3700   WILT(11)        4.3700   WILT(12)        4.3700
  WILT(13)        7.6500   WILT(14)        7.6500   WILT(15)        7.6500
  XMPOR(1)        35.710   XMPOR(2)        35.710   XMPOR(3)        35.710
  XMPOR(4)        35.710   XMPOR(5)        35.710   XMPOR(6)        24.350
  XMPOR(7)        24.350   XMPOR(8)        24.350   XMPOR(9)        24.350
  XMPOR(10)       21.340   XMPOR(11)       21.340   XMPOR(12)       21.340
  XMPOR(13)       25.310   XMPOR(14)       25.310   XMPOR(15)       25.310
  ZA(1)                1   ZA(2)                1   ZA(3)                1
  ZA(4)                1   ZA(5)                1   ZA(6)                1
  ZA(7)                1   ZA(8)                1   ZA(9)                1
  ZA(10)               1   ZA(11)               1   ZA(12)               1
  ZA(13)               1   ZA(14)               1   ZA(15)               1
  ZLAMB(1)        .16300   ZLAMB(2)        .16300   ZLAMB(3)        .16300
  ZLAMB(4)        .16300   ZLAMB(5)        .16300   ZLAMB(6)        .15100
  ZLAMB(7)        .15100   ZLAMB(8)        .15100   ZLAMB(9)        .15100
  ZLAMB(10)       .24500   ZLAMB(11)       .24500   ZLAMB(12)       .24500
  ZLAMB(13)       .17800   ZLAMB(14)       .17800   ZLAMB(15)       .17800
  ZM(1)           .50000   ZM(2)           .50000   ZM(3)           .50000
  ZM(4)           .50000   ZM(5)           .50000   ZM(6)           .50000
```

```
  ZM(7)            .50000   ZM(8)            .50000   ZM(9)            .50000
  ZM(10)           .50000   ZM(11)           .50000   ZM(12)           .50000
  ZM(13)           .50000   ZM(14)           .50000   ZM(15)           .50000
  ZN(1)            4.4000   ZN(2)            4.4000   ZN(3)            4.4000
  ZN(4)            4.4000   ZN(5)            4.4000   ZN(6)            4.4000
  ZN(7)            4.4000   ZN(8)            4.4000   ZN(9)            4.4000
  ZN(10)           4.4000   ZN(11)           4.4000   ZN(12)           4.4000
  ZN(13)           4.4000   ZN(14)           4.4000   ZN(15)           4.4000
  ZP(1)                 0   ZP(2)                 0   ZP(3)                 0
  ZP(4)                 0   ZP(5)                 0   ZP(6)                 0
  ZP(7)                 0   ZP(8)                 0   ZP(9)                 0
  ZP(10)                0   ZP(11)                0   ZP(12)                0
  ZP(13)                0   ZP(14)                0   ZP(15)                0

# Crop ------------------------------------------------------------------------

  BETA             .20000   CANCAP           2.0000   CFORM            1.7000
  CRITAIR          5.0000   DFORM            .70000   IDMAX               150
  IDSTART             285   IHARV               219   LAIHAR           1.0000
  LAIMAX           6.2000   LAIMIN           1.0000   ROOTINIT         .20000
  ROOTMAX          .80000   RPIN             70.000   WATEN            5.0000
  ZALP             1.0000   ZDATEMIN             45   ZHMIN            .15000

# Irrigation ------------------------------------------------------------------

  AMIR(1)            0.02   CONCI(1)         1e+007   CRITDEF              -1
  IRRDAY(1)           305   IRREND(1)           9.2   IRRSTART(1)           9
  NIRR                  1   ZFINT(1)         .10000
# ------------------------------------------------------------------------------
# Control variables
# ------------------------------------------------------------------------------
  STARTDAT      "1985-01-01 00:00"
  ENDDAT        "1988-12-31 24:00"
  OUTINTD               1
  OUTINTM               0
  NUMITER               0
  RUNID         "Pesticide L on Wick"
# ------------------------------------------------------------------------------
# Selected output variables
# ------------------------------------------------------------------------------

# Water balance ---------------------------------------------------------------

  CCEPOT        [1]
  CCET          [1]
  CETA          [1]
  CUPT          [1]
  EPOT          [1]
  PRECIRA       [1]
  PRECIRR       [1]
  SRUNOFF       [1]
  TFLOW         [1]
  TFLOWOUT      [1]
  TRUNOFF       [1]
  WWW           [1]

# Solute balance  -------------------------------------------------------------

  SSS           [1]
  TDEG          [1]
  TSOUT         [1]
  TSRUN         [1]
  TSS           [1]
# ------------------------------------------------------------------------------
# Files
# ------------------------------------------------------------------------------
# Input file rainfall ---------------------------------------------------------
  FILE(1)  WRRAIN.BIN
# Parameter file --------------------------------------------------------------
  FILE(2)  MLW.PAR
# Translation file ------------------------------------------------------------
  FILE(3)  MACRO.TRA
# Input file evaporation/meteorological data ----------------------------------
  FILE(8)  WRPET.BIN

# ------------------------------------------------------------------------------
```

```
# Parameters to be changed during run
# ------------------------------------------------------------------------------
  At: "1986-01-01 12:00:"
  NIRR                  0
;
```



Appendix 2. Flow chart explaining the combination of MACRO and SENSAN

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

Appendix 3. List of MACRO parameters included in the sensitivity analyses

	Initial value	Absolute values		Perc. of variation		Multiplication factor	
		Min	Max	Min	Max	Min	Max
ANNAMP	8	6	10	-25	25	0.75	1.25
ANNTAV	8	6	10	-25	25	0.75	1.25
RINTEN	2	1	4	-50	100	0.5	2
TEMPINI	8	6	10	-25	25	0.75	1.25
THETAINI	27.75	20.8125	34.6875	-25	25	0.75	1.25
DIFF	4.6E-10	1E-10	1.00E-09	-78.26	117.39	0.22	2.17
DV	1	0.2	5	-80	400	0.2	5
ZMIX	1	0.25	20	-75	1900	0.25	20
CANDEG	0.0893	0.04465	0.1786	-50	100	0.5	2
DEG	0.0893	0.04465	0.1786	-50	100	0.5	2
EXPB	0.7	0.42	0.98	-40	40	0.6	1.4
FEXT	0.01	0.005	0.02	-50	100	0.5	2
FRACMAC	0.02	0.005	0.1	-75	400	0.25	5
FREUND	0.9	0.72	1.08	-20	20	0.8	1.2
TRESP	0.08	0.06	0.1	-25	25	0.75	1.25
ZKD	0.34	0.17	0.68	-50	100	0.5	2
ASCALE	20	10	40	-50	100	0.5	2
CTEN	10	5	20	-50	100	0.5	2
GAMMA	1.35	1.215	1.485	-10	10	0.9	1.1
KSATMIN	120	30	480	-75	300	0.25	4
KSM	0.492	0.246	0.738	-50	50	0.5	1.5
TPORV	46.56	41.904	51.216	-10	10	0.9	1.1
WILT	10.54	9.486	11.594	-10	10	0.9	1.1
XMPOR	35.71	32.139	39.281	-10	10	0.9	1.1
ZLAMB	0.163	0.0815	0.326	-50	100	0.5	2
ZM	0.5	0.25	1	-50	100	0.5	2
ZN	4.4	3.96	4.84	-10	10	0.9	1.1
BETA	0.2	0.1	0.4	-50	100	0.5	2
CANCAP	2	1	4	-50	100	0.5	2
CFORM	1.7	1.3	2	-23.53	17.65	0.76	1.18
CRITAIR	5	2	8	-60	60	0.4	1.6
DFORM	0.7	0.5	0.8	-28.57	14.29	0.71	1.14
LAIHAR	1	0.5	2	-50	100	0.5	2
LAIMAX	6.2	5.2	7.2	-16.13	16.13	0.84	1.16
LAIMIN	1	0.5	2	-50	100	0.5	2
ROOTINIT	0.2	0.1	0.4	-50	100	0.5	2
ROOTMAX	0.8	0.6	1	-25	25	0.75	1.25
RPIN	70	60	80	-14.29	14.29	0.86	1.14
WATEN	5	1	20	-80	300	0.2	4
ZALP	1	1	1.3	0	30	1	1.3
ZHMIN	0.15	0.1	0.2	-33.33	33.33	0.67	1.33
ZFINT	0.1	0.05	0.2	-50	100	0.5	2

Appendix 4. Variation attributed to MACRO input parameters for the one-at-a-time sensitivity analysis *Pesticide L on Wick* scenario

	Initial value	Absolute values		Perc. of variation		Multiplication factor	
		Min	Max	Min	Max	Min	Max
ANNAMP	8	6	10	-25	25	0.75	1.25
ANNTAV	8	6	10	-25	25	0.75	1.25
RINTEN	2	1	4	-50	100	0.5	2
TEMPINI	8	6	10	-25	25	0.75	1.25
THETAINI	27.75	20.8125	34.6875	-25	25	0.75	1.25
DIFF	4.6E-10	1E-10	1E-09	-78.26	117.39	0.22	2.17
DV	1	0.2	5	-80	400	0.2	5
ZMIX	1	0.25	20	-75	1900	0.25	20
CANDEG	0.0298	0.0149	0.0596	-50	100	0.5	2
DEG	0.0298	0.0149	0.0596	-50	100	0.5	2
EXPB	0.7	0.42	0.98	-40	40	0.6	1.4
FEXT	0.01	0.005	0.02	-50	100	0.5	2
FRACMAC	0.02	0.005	0.1	-75	400	0.25	5
FREUND	0.9	0.72	1.08	-20	20	0.8	1.2
TRESP	0.08	0.06	0.1	-25	25	0.75	1.25
ZKD	1.7	0.85	3.4	-50	100	0.5	2
ASCALE	20	10	40	-50	100	0.5	2
CTEN	10	5	20	-50	100	0.5	2
GAMMA	1.35	1.215	1.485	-10	10	0.9	1.1
KSATMIN	120	30	480	-75	300	0.25	4
KSM	0.492	0.246	0.738	-50	50	0.5	1.5
TPORV	46.56	41.904	51.216	-10	10	0.9	1.1
WILT	10.54	9.486	11.594	-10	10	0.9	1.1
XMPOR	35.71	32.139	39.281	-10	10	0.9	1.1
ZLAMB	0.163	0.0815	0.326	-50	100	0.5	2
ZM	0.5	0.25	1	-50	100	0.5	2
ZN	4.4	3.96	4.84	-10	10	0.9	1.1
BETA	0.2	0.1	0.4	-50	100	0.5	2
CANCAP	2	1	4	-50	100	0.5	2
CFORM	1.7	1.3	2	-23.53	17.65	0.76	1.18
CRITAIR	5	2	8	-60	60	0.4	1.6
DFORM	0.7	0.5	0.8	-28.57	14.29	0.71	1.14
LAIHAR	1	0.5	2	-50	100	0.5	2
LAIMAX	6.2	5.2	7.2	-16.13	16.13	0.84	1.16
LAIMIN	1	0.5	2	-50	100	0.5	2
ROOTINIT	0.2	0.1	0.4	-50	100	0.5	2
ROOTMAX	0.8	0.6	1	-25	25	0.75	1.25
RPIN	70	60	80	-14.29	14.29	0.86	1.14
WATEN	5	1	20	-80	300	0.2	4
ZALP	1	1	1.3	0	30	1	1.3
ZHMIN	0.15	0.1	0.2	-33.33	33.33	0.67	1.33
ZFINT	0.1	0.05	0.2	-50	100	0.5	2

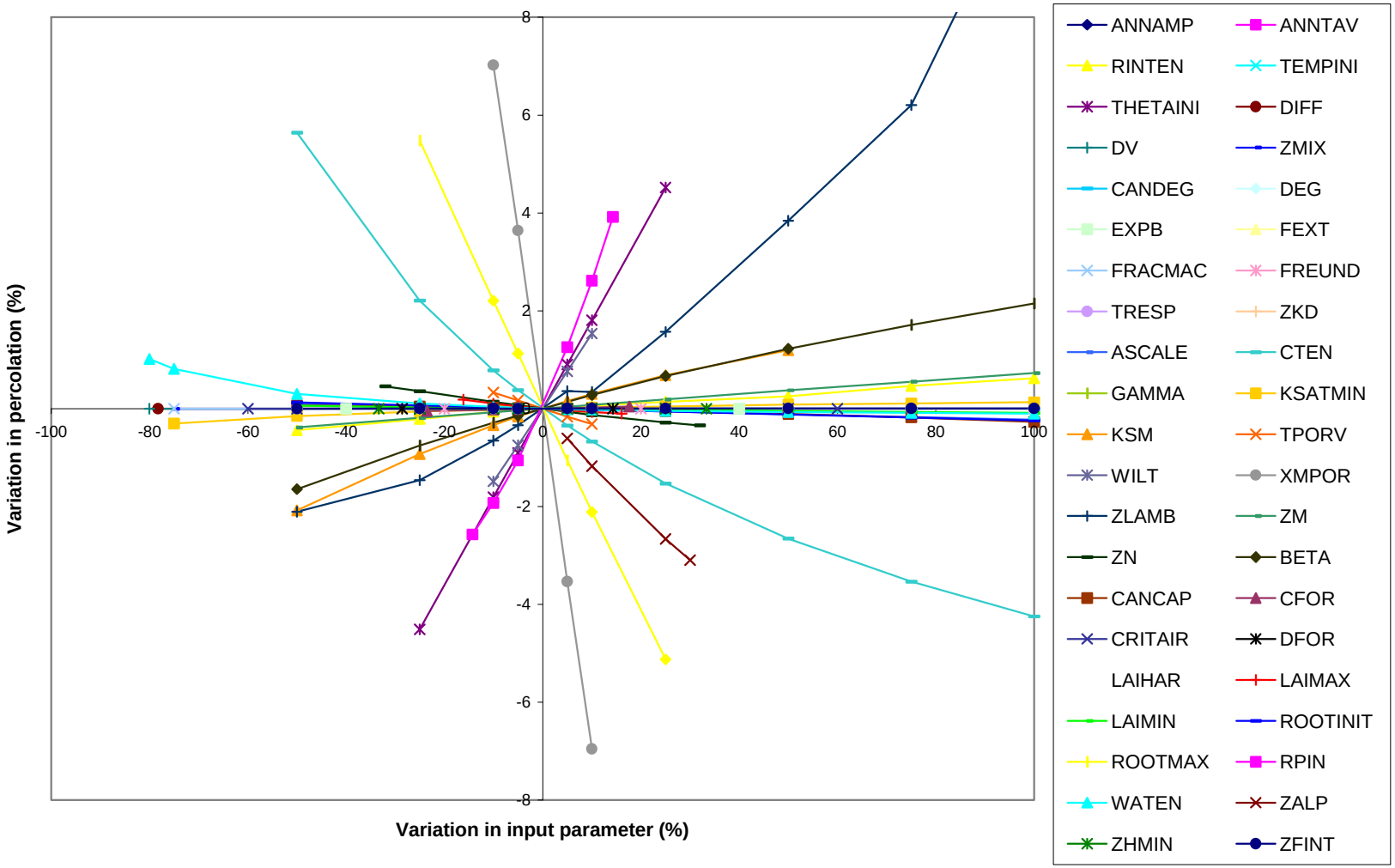
Appendix 5. Variation attributed to MACRO input parameters for the one-at-a-time sensitivity analysis *Pesticide T on Wick* scenario

	Initial value	Absolute values		Perc. of variation		Multiplication factor	
		Min	Max	Min	Max	Min	Max
ANNAMP	8	6	10	-25	25	0.75	1.25
ANNTAV	8	6	10	-25	25	0.75	1.25
RINTEN	2	1	4	-50	100	0.5	2
TEMPINI	8	6	10	-25	25	0.75	1.25
THETAINI	34.9	26.175	43.625	-25	25	0.75	1.25
DIFF	4.6E-10	1E-10	1E-09	-78.26	117.39	0.22	2.17
DV	1	0.2	5	-80	400	0.2	5
ZMIX	1	0.25	20	-75	1900	0.25	20
CANDEG	0.0893	0.04465	0.1786	-50	100	0.5	2
DEG	0.0893	0.04465	0.1786	-50	100	0.5	2
EXPB	0.7	0.42	0.98	-40	40	0.6	1.4
FEXT	0.01	0.005	0.02	-50	100	0.5	2
FRACMAC	0.02	0.01	0.04	-50	100	0.5	2
FREUND	0.9	0.72	1.08	-20	20	0.8	1.2
TRESP	0.08	0.06	0.1	-25	25	0.75	1.25
ZKD	0.23	0.115	0.46	-50	100	0.5	2
ASCALE	20	10	40	-50	100	0.5	2
CTEN	18	9	36	-50	100	0.5	2
GAMMA	1.39	1.251	1.529	-10	10	0.9	1.1
KSATMIN	39.25	9.8125	157	-75	300	0.25	4
KSM	0.088	0.044	0.44	-50	400	0.5	5
TPORV	46.8	42.12	51.48	-10	10	0.9	1.1
WILT	16.8	15.12	18.48	-10	10	0.9	1.1
XMPOR	38.74	34.866	42.614	-10	10	0.9	1.1
ZLAMB	0.084	0.042	0.168	-50	100	0.5	2
ZM	0.5	0.25	1	-50	100	0.5	2
ZN	4.92	4.428	5.412	-10	10	0.9	1.1
BETA	0.2	0.1	0.4	-50	100	0.5	2
CANCAP	2	1	4	-50	100	0.5	2
CFORM	1.7	1.3	2	-23.53	17.65	0.76	1.18
CRITAIR	5	2	8	-60	60	0.4	1.6
DFORM	0.7	0.5	0.8	-28.57	14.29	0.71	1.14
LAIHAR	1	0.5	2	-50	100	0.5	2
LAIMAX	6.2	5.2	7.2	-16.13	16.13	0.84	1.16
LAIMIN	1	0.5	2	-50	100	0.5	2
ROOTINIT	0.2	0.1	0.4	-50	100	0.5	2
ROOTMAX	0.8	0.6	1	-25	25	0.75	1.25
RPIN	70	60	80	-14.29	14.29	0.86	1.14
WATEN	20	10	30	-50	50	0.5	1.5
ZALP	1	1	1.3	0	30	1	1.3
ZHMIN	0.15	0.1	0.2	-33.33	33.33	0.67	1.33
ZFINT	0.1	0.05	0.2	-50	100	0.5	2

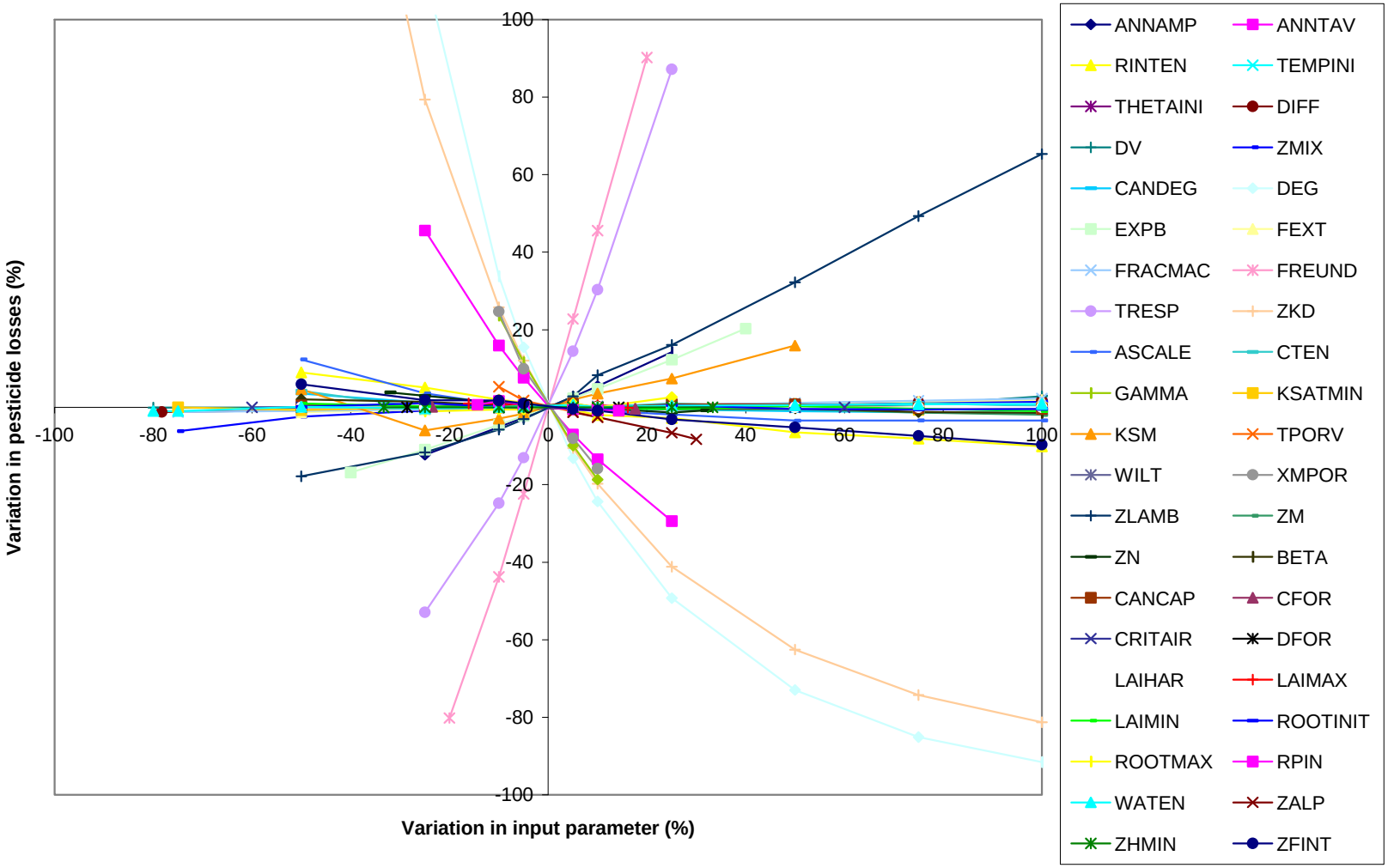
Appendix 6. Variation attributed to MACRO input parameters for the one-at-a-time sensitivity analysis *Pesticide L on Hodnet* scenario

	Initial value	Absolute values		Perc. of variation		Multiplication factor	
		Min	Max	Min	Max	Min	Max
ANNAMP	8	6	10	-25	25	0.75	1.25
ANNTAV	8	6	10	-25	25	0.75	1.25
RINTEN	2	1	4	-50	100	0.5	2
TEMPINI	8	6	10	-25	25	0.75	1.25
THETAINI	34.9	26.175	43.625	-25	25	0.75	1.25
DIFF	4.6E-10	1E-10	1E-09	-78.26	117.39	0.22	2.17
DV	1	0.2	5	-80	400	0.2	5
ZMIX	1	0.25	20	-75	1900	0.25	20
CANDEG	0.0298	0.0149	0.0596	-50	100	0.5	2
DEG	0.0298	0.0149	0.0596	-50	100	0.5	2
EXPB	0.7	0.42	0.98	-40	40	0.6	1.4
FEXT	0.01	0.005	0.02	-50	100	0.5	2
FRACMAC	0.02	0.01	0.04	-50	100	0.5	2
FREUND	0.9	0.72	1.08	-20	20	0.8	1.2
TRESP	0.08	0.06	0.1	-25	25	0.75	1.25
ZKD	1.15	0.575	2.3	-50	100	0.5	2
ASCALE	20	10	40	-50	100	0.5	2
CTEN	18	9	36	-50	100	0.5	2
GAMMA	1.39	1.251	1.529	-10	10	0.9	1.1
KSATMIN	39.25	9.8125	157	-75	300	0.25	4
KSM	0.088	0.044	0.44	-50	400	0.5	5
TPORV	46.8	42.12	51.48	-10	10	0.9	1.1
WILT	16.8	15.12	18.48	-10	10	0.9	1.1
XMPOR	38.74	34.866	42.614	-10	10	0.9	1.1
ZLAMB	0.084	0.042	0.168	-50	100	0.5	2
ZM	0.5	0.25	1	-50	100	0.5	2
ZN	4.92	4.428	5.412	-10	10	0.9	1.1
BETA	0.2	0.1	0.4	-50	100	0.5	2
CANCAP	2	1	4	-50	100	0.5	2
CFORM	1.7	1.3	2	-23.53	17.65	0.76	1.18
CRITAIR	5	2	8	-60	60	0.4	1.6
DFORM	0.7	0.5	0.8	-28.57	14.29	0.71	1.14
LAIHAR	1	0.5	2	-50	100	0.5	2
LAIMAX	6.2	5.2	7.2	-16.13	16.13	0.84	1.16
LAIMIN	1	0.5	2	-50	100	0.5	2
ROOTINIT	0.2	0.1	0.4	-50	100	0.5	2
ROOTMAX	0.8	0.6	1	-25	25	0.75	1.25
RPIN	70	60	80	-14.29	14.29	0.86	1.14
WATEN	20	10	30	-50	50	0.5	1.5
ZALP	1	1	1.3	0	30	1	1.3
ZHMIN	0.15	0.1	0.2	-33.33	33.33	0.67	1.33
ZFINT	0.1	0.05	0.2	-50	100	0.5	2

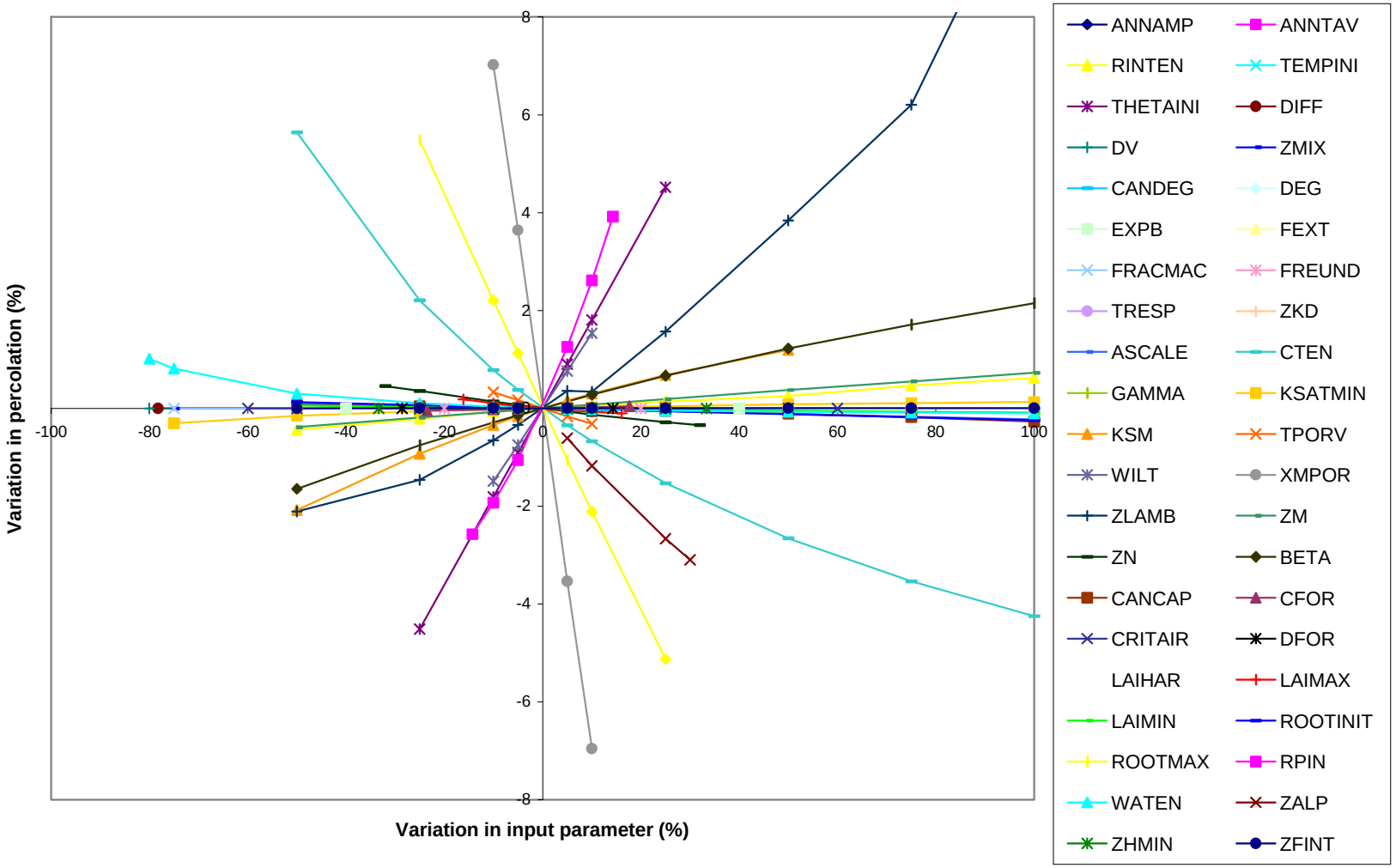
Appendix 7. Variation attributed to MACRO input parameters for the one-at-a-time sensitivity analysis *Pesticide T on Hodnet* scenario



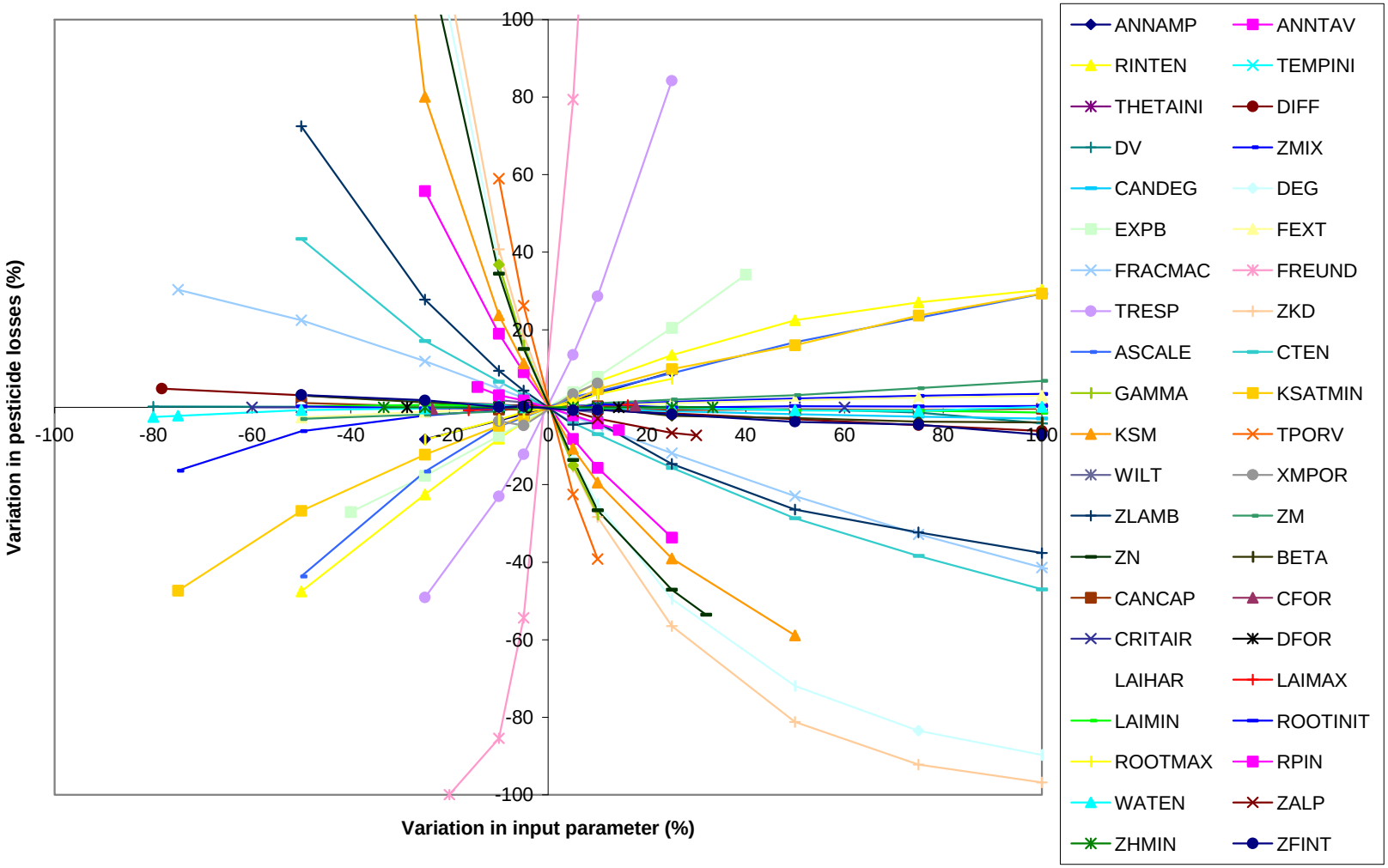
Appendix 8. Influence of the variation of input parameters on percolation predicted by MACRO – *Pesticide L on Wick* scenario
The closer the curve to the Y-axis, the more influence the parameter has.



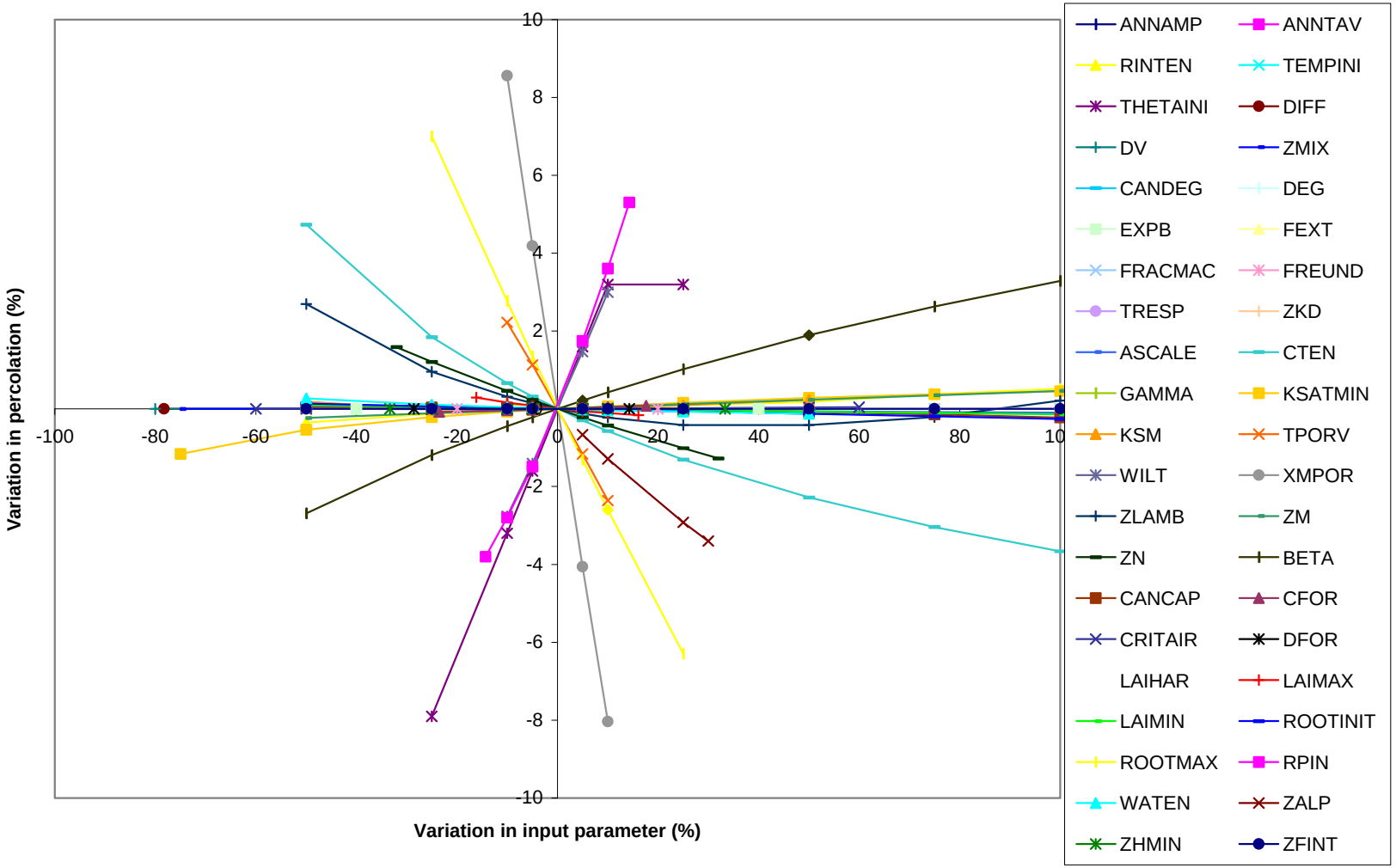
Appendix 9. Influence of the variation of input parameters on pesticide losses predicted by MACRO – *Pesticide L on Wick* scenario
The closer the curve to the Y-axis, the more influence the parameter has.



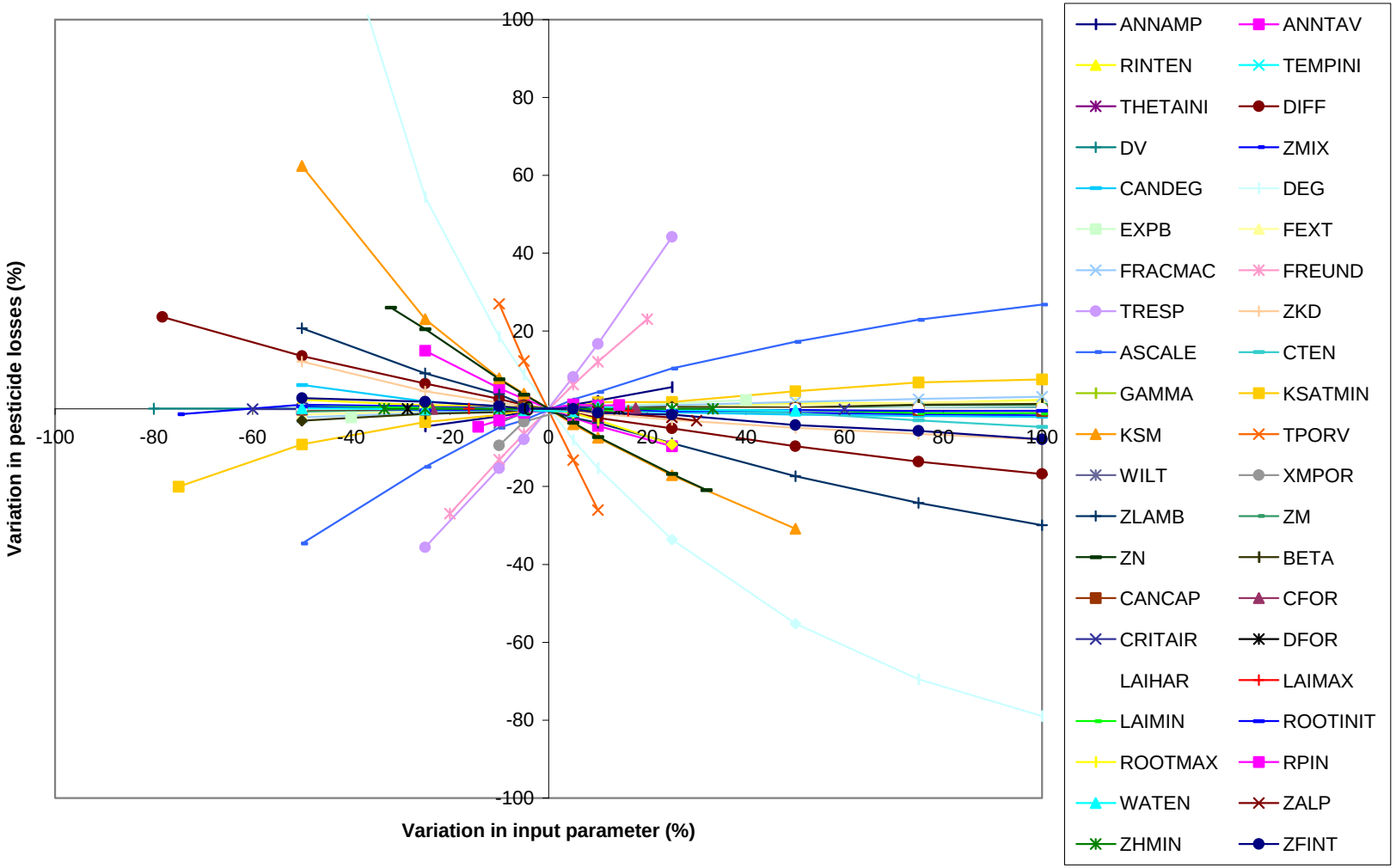
Appendix 10. Influence of the variation of input parameters on percolation predicted by MACRO – *Pesticide T on Wick* scenario
The closer the curve to the Y-axis, the more influence the parameter has.



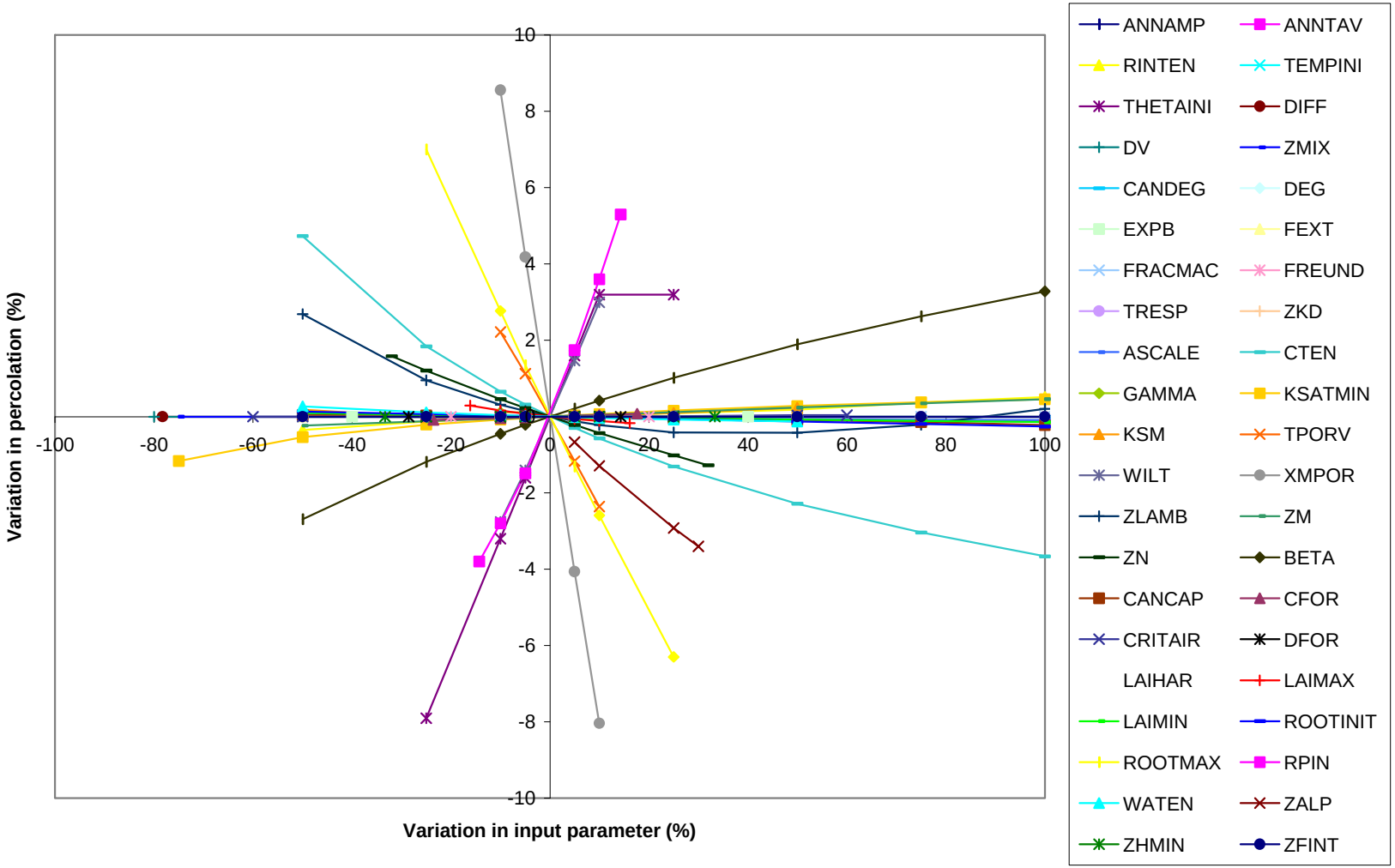
Appendix 11. Influence of the variation of input parameters on pesticide losses predicted by MACRO – *Pesticide T on Wick* scenario
The closer the curve to the Y-axis, the more influence the parameter has.



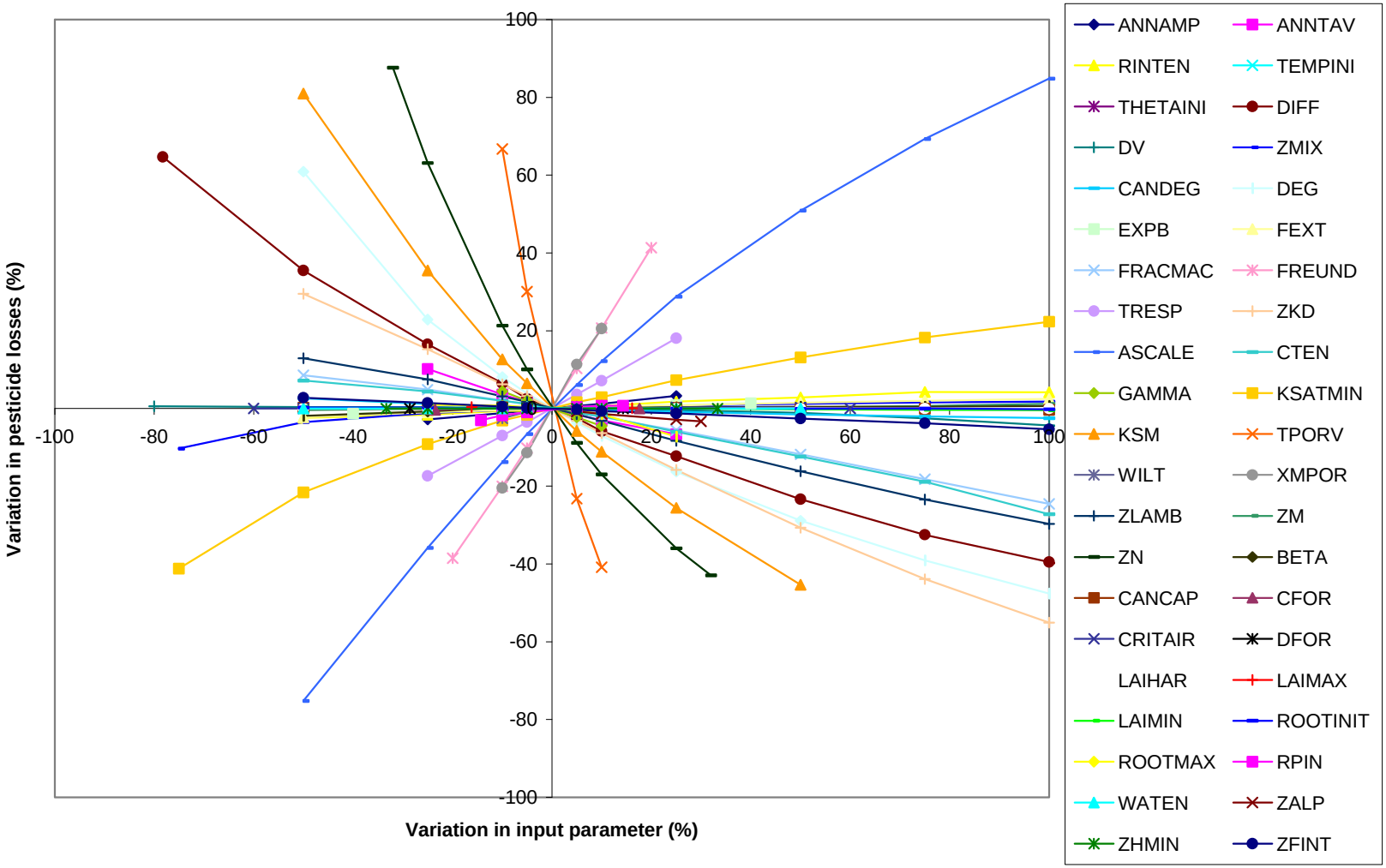
Appendix 12. Influence of the variation of input parameters on percolation predicted by MACRO – *Pesticide L on Hodnet* scenario
The closer the curve to the Y-axis, the more influence the parameter has.



Appendix 13. Influence of the variation of input parameters on pesticide losses predicted by MACRO – *Pesticide L on Hodnet* scenario
The closer the curve to the Y-axis, the more influence the parameter has.



Appendix 14. Influence of the variation of input parameters on percolation predicted by MACRO – *Pesticide T on Hodnet* scenario
The closer the curve to the Y-axis, the more influence the parameter has.



Appendix 15. Influence of the variation of input parameters on pesticide losses predicted by MACRO – *Pesticide T on Hodnet* scenario
The closer the curve to the Y-axis, the more influence the parameter has.

	Parameter	Description	MAROV	Influence
1	XMPOR	Boundary soil water content	0.728	-
2	RPIN	Root distribution	0.274	+
3	ROOTMAX	Max root depth	0.226	-
4	THETAINI	Initial soil moisture	0.181	+
5	WILT	Wilting point	0.153	+
6	ZALP	Correction factor for wet canopy evaporation	0.122	-
7	ZLAMB	Pore size distribution index	0.114	+
8	CTEN	Boundary soil water tension	0.113	-
9	KSM	Boundary hydraulic conductivity	0.042	+
10	TPORV	Saturated water content	0.034	-
11	BETA	Root adaptability factor	0.033	+
12	ZN	Pore size distribution factor macropores	0.014	-
13	WATEN	Critical water tension for root water uptake	0.013	-
14	GAMMA	Bulk density	0.012	-
15	LAIMAX	Max Leaf Area Index	0.011	-
16	RINTEN	Rainfall intensity	0.009	+
17	ZM	Tortuosity factor micropores	0.008	+
18	KSATMIN	Saturated hydraulic conductivity	0.004	+
19	ROOTINIT	Root Depth at zdatemin	0.003	-
20	CANCAP	Canopy Interception Capacity	0.003	-
21	CFORM	Form factor	0.002	+
22	ASCALE	Effective diffusion pathlength	0.002	-
23	LAIMIN	Leaf Area Index at zdatemin	0.001	-
24	ZFINT	Fraction of irrigation intercepted by canopy	0.000	+
	ANNAMP	Temperature annual amplitude	0	
	ANNTAV	Average annual temperature	0	
	TEMPINI	Initial soil temperature	0	
	DIFF	Diffusion coefficient in water	0	
	DV	Dispersivity	0	
	ZMIX	Mixing depth	0	
	CANDEG	Canopy degradation rate	0	
	DEG	degradation rates	0	
	EXPB	Exponent moisture relation	0	
	FEXT	Canopy wash-off coefficient	0	
	FRACMAC	Fraction sorption sites macropores	0	
	FREUND	Freundlich exponent	0	
	TRESP	Exponent Temperature response	0	
	ZKD	Sorption coefficient	0	
	CRITAIR	Critical soil air content for root water uptake	0	
	DFORM	Form factor	0	
	LAIHAR	Leaf Area Index at harvest	0	
	ZHMIN	Crop height at zdatemin	0	

Appendix 16. Classification of MACRO input parameters according to their influence on percolation results for the *Pesticide L on Wick* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in percolation.

	Parameter	Description	MAROV	Influence
1	DEG	degradation rates	8.157	-
2	FREUND	Freundlich exponent	4.552	+
3	ZKD	Sorption coefficient	4.496	-
4	TRESP	Exponent Temperature response	3.488	+
5	XMPOR	Boundary soil water content	2.469	-
6	GAMMA	Bulk density	2.363	-
7	ANNTAV	Average annual temperature	1.823	-
8	ZLAMB	Pore size distribution index	0.829	+
9	ANNAMP	Temperature annual amplitude	0.568	+
10	TPORV	Saturated water content	0.524	-
11	EXPB	Exponent moisture relation	0.507	+
12	KSM	Boundary hydraulic conductivity	0.389	+
13	ZALP	Correction factor for wet canopy evaporation	0.276	-
14	ASCALE	Effective diffusion pathlength	0.247	-
15	RINTEN	Rainfall intensity	0.232	-
16	ZFINT	Fraction of irrigation intercepted by canopy	0.193	-
17	ROOTMAX	Max root depth	0.188	+
18	CANCAP	Canopy Interception Capacity	0.183	+
19	RPIN	Root distribution	0.157	-
20	KSATMIN	Saturated hydraulic conductivity	0.147	+
21	DV	Dispersivity	0.134	+
22	BETA	Root adaptability factor	0.132	-
23	WATEN	Critical water tension for root water uptake	0.132	+
24	ZN	Pore size distribution factor macropores	0.131	-
25	WILT	Wilting point	0.125	-
26	ZM	Tortuosity factor micropores	0.113	+
27	LAIMAX	Max Leaf Area Index	0.092	-
28	CTEN	Boundary soil water tension	0.085	+
29	THETAINI	Initial soil moisture	0.085	-
30	ZMIX	Mixing depth	0.082	+
31	LAIMIN	Leaf Area Index at zdatemin	0.079	-
32	CANDEG	Canopy degradation rate	0.070	-
33	ROOTINIT	Root Depth at zdatemin	0.056	-
34	CFORM	Form factor	0.050	-
35	FEXT	Canopy wash-off coefficient	0.026	+
36	FRACMAC	Fraction sorption sites macropores	0.023	+
37	DIFF	Diffusion coefficient in water	0.019	+
	TEMPINI	Initial soil temperature	0	
	CRITAIR	Critical soil air content for root water uptake	0	
	DFORM	Form factor	0	
	LAIHAR	Leaf Area Index at harvest	0	
	ZHMIN	Crop height at zdatemin	0	

Appendix 17. Classification of MACRO input parameters according to their influence on pesticide losses for the *Pesticide L on Wick* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in pesticide losses

	Parameter	Description	MAROV	Influence
1	XMPOR	Boundary soil water content	0.728	-
2	RPIN	Root distribution	0.274	+
3	ROOTMAX	Max root depth	0.226	-
4	THETAINI	Initial soil moisture	0.181	+
5	WILT	Wilting point	0.153	+
6	ZALP	Correction factor for wet canopy evaporation	0.122	-
7	ZLAMB	Pore size distribution index	0.114	+
8	CTEN	Boundary soil water tension	0.113	-
9	KSM	Boundary hydraulic conductivity	0.042	+
10	TPORV	Saturated water content	0.034	-
11	BETA	Root adaptability factor	0.033	+
12	ZN	Pore size distribution factor macropores	0.014	-
13	WATEN	Critical water tension for root water uptake	0.013	-
14	GAMMA	Bulk density	0.012	-
15	LAIMAX	Max Leaf Area Index	0.011	-
16	RINTEN	Rainfall intensity	0.009	+
17	ZM	Tortuosity factor micropores	0.008	+
18	KSATMIN	Saturated hydraulic conductivity	0.004	+
19	ROOTINIT	Root Depth at zdatemin	0.003	-
20	CANCAP	Canopy Interception Capacity	0.003	-
21	CFORM	Form factor	0.002	+
22	ASCALE	Effective diffusion pathlength	0.002	-
23	LAIMIN	Leaf Area Index at zdatemin	0.001	-
24	ZFINT	Fraction of irrigation intercepted by canopy	0.000	+
	ANNAMP	Temperature annual amplitude	0	
	ANNTAV	Average annual temperature	0	
	TEMPINI	Initial soil temperature	0	
	DIFF	Diffusion coefficient in water	0	
	DV	Dispersivity	0	
	ZMIX	Mixing depth	0	
	CANDEG	Canopy degradation rate	0	
	DEG	degradation rates	0	
	EXPB	Exponent moisture relation	0	
	FEXT	Canopy wash-off coefficient	0	
	FRACMAC	Fraction sorption sites macropores	0	
	FREUND	Freundlich exponent	0	
	TRESP	Exponent Temperature response	0	
	ZKD	Sorption coefficient	0	
	CRITAIR	Critical soil air content for root water uptake	0	
	DFORM	Form factor	0	
	LAIHAR	Leaf Area Index at harvest	0	
	ZHMIN	Crop height at zdatemin	0	

Appendix 18. Classification of MACRO input parameters according to their influence on percolation results for the *Pesticide T on Wick* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in percolation

	Parameter	Description	MAROV	Influence
1	FREUND	Freundlich exponent	22.211	+
2	ZKD	Sorption coefficient	12.129	-
3	DEG	degradation rates	11.942	-
4	KSM	Boundary hydraulic conductivity	7.000	-
5	TPORV	Saturated water content	5.895	-
6	ZN	Pore size distribution factor macropores	5.615	-
7	GAMMA	Bulk density	3.680	-
8	TRESP	Exponent Temperature response	3.369	+
9	ANNTAV	Average annual temperature	2.231	-
10	ZLAMB	Pore size distribution index	1.450	-
11	RINTEN	Rainfall intensity	0.950	+
12	XMPOR	Boundary soil water content	0.948	+
13	ASCALE	Effective diffusion pathlength	0.873	+
14	CTEN	Boundary soil water tension	0.868	-
15	EXPB	Exponent moisture relation	0.855	+
16	KSATMIN	Saturated hydraulic conductivity	0.631	+
17	FRACMAC	Fraction sorption sites macropores	0.481	-
18	RPIN	Root distribution	0.414	-
19	ANNAMP	Temperature annual amplitude	0.362	+
20	ROOTMAX	Max root depth	0.336	+
21	ZALP	Correction factor for wet canopy evaporation	0.293	-
22	WILT	Wilting point	0.248	-
23	ZMIX	Mixing depth	0.218	+
24	ZFINT	Fraction of irrigation intercepted by canopy	0.165	-
25	THETAINI	Initial soil moisture	0.141	-
26	CANCAP	Canopy Interception Capacity	0.126	+
27	BETA	Root adaptability factor	0.119	-
28	ZM	Tortuosity factor micropores	0.112	+
29	LAIMIN	Leaf Area Index at zdatemin	0.111	+
30	ROOTINIT	Root Depth at zdatemin	0.087	+
31	WATEN	Critical water tension for root water uptake	0.080	-
32	DIFF	Diffusion coefficient in water	0.067	-
33	CFORM	Form factor	0.064	+
34	CANDEG	Canopy degradation rate	0.062	-
35	FEXT	Canopy wash-off coefficient	0.054	+
36	LAIMAX	Max Leaf Area Index	0.053	+
37	DV	Dispersivity	0.050	-
	TEMPINI	Initial soil temperature	0	
	CRITAIR	Critical soil air content for root water uptake	0	
	DFORM	Form factor	0	
	LAIHAR	Leaf Area Index at harvest	0	
	ZHMIN	Crop height at zdatemin	0	

Appendix 19. Classification of MACRO input parameters according to their influence on pesticide losses for the *Pesticide T on Wick* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in pesticide losses

	Parameter	Description	MAROV	Influence
1	XMPOR	Boundary soil water content	0.856	-
2	RPIN	Root distribution	0.371	+
3	THETAINI	Initial soil moisture	0.320	+
4	WILT	Wilting point	0.300	+
5	ROOTMAX	Max root depth	0.280	-
6	TPORV	Saturated water content	0.236	-
7	ZALP	Correction factor for wet canopy evaporation	0.133	-
8	CTEN	Boundary soil water tension	0.095	-
9	ZLAMB	Pore size distribution index	0.054	-
10	BETA	Root adaptability factor	0.054	+
11	ZN	Pore size distribution factor macropores	0.049	-
12	GAMMA	Bulk density	0.021	-
13	LAIMAX	Max Leaf Area Index	0.018	-
14	KSATMIN	Saturated hydraulic conductivity	0.015	+
15	RINTEN	Rainfall intensity	0.007	+
16	WATEN	Critical water tension for root water uptake	0.005	-
17	ZM	Tortuosity factor micropores	0.005	+
18	KSM	Boundary hydraulic conductivity	0.005	+
19	CFORM	Form factor	0.004	+
20	ROOTINIT	Root Depth at zdatemin	0.003	-
21	CANCAP	Canopy Interception Capacity	0.002	-
22	LAIMIN	Leaf Area Index at zdatemin	0.002	-
23	ASCALE	Effective diffusion pathlength	0.002	-
24	CRITAIR	Critical soil air content for root water uptake	0.001	+
25	ZFINT	Fraction of irrigation intercepted by canopy	0.000	+
	ANNAMP	Temperature annual amplitude	0	
	ANNTAV	Average annual temperature	0	
	TEMPINI	Initial soil temperature	0	
	DIFF	Diffusion coefficient in water	0	
	DV	Dispersivity	0	
	ZMIX	Mixing depth	0	
	CANDEG	Canopy degradation rate	0	
	DEG	degradation rates	0	
	EXPB	Exponent moisture relation	0	
	FEXT	Canopy wash-off coefficient	0	
	FRACMAC	Fraction sorption sites macropores	0	
	FREUND	Freundlich exponent	0	
	TRESP	Exponent Temperature response	0	
	ZKD	Sorption coefficient	0	
	DFORM	Form factor	0	
	LAIHAR	Leaf Area Index at harvest	0	
	ZHMIN	Crop height at zdatemin	0	

Appendix 20. Classification of MACRO input parameters according to their influence on percolation results for the *Pesticide L on Hodnet* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in percolation

	Parameter	Description	MAROV	Influence
1	DEG	degradation rates	3.097	-
2	TPORV	Saturated water content	2.696	-
3	TRESP	Exponent Temperature response	1.765	+
4	FREUND	Freundlich exponent	1.348	+
5	KSM	Boundary hydraulic conductivity	1.247	-
6	XMPOR	Boundary soil water content	0.938	+
7	ZN	Pore size distribution factor macropores	0.818	-
8	ASCALE	Effective diffusion pathlength	0.692	+
9	ANNTAV	Average annual temperature	0.597	-
10	ZLAMB	Pore size distribution index	0.456	-
11	ROOTMAX	Max root depth	0.366	-
12	WILT	Wilting point	0.363	+
13	RPIN	Root distribution	0.322	+
14	DIFF	Diffusion coefficient in water	0.302	-
15	KSATMIN	Saturated hydraulic conductivity	0.267	+
16	ZKD	Sorption coefficient	0.242	-
17	ANNAMP	Temperature annual amplitude	0.222	+
18	THETAINI	Initial soil moisture	0.152	+
19	WATEN	Critical water tension for root water uptake	0.136	-
20	CANCAP	Canopy Interception Capacity	0.126	-
21	CANDEG	Canopy degradation rate	0.122	-
22	BETA	Root adaptability factor	0.112	+
23	ZFINT	Fraction of irrigation intercepted by canopy	0.104	-
24	ZALP	Correction factor for wet canopy evaporation	0.101	-
25	CRITAIR	Critical soil air content for root water uptake	0.092	+
26	RINTEN	Rainfall intensity	0.091	-
27	CTEN	Boundary soil water tension	0.069	-
28	GAMMA	Bulk density	0.067	-
29	ZM	Tortuosity factor micropores	0.065	-
30	ROOTINIT	Root Depth at zdatemin	0.064	+
31	EXPB	Exponent moisture relation	0.056	+
32	CFORM	Form factor	0.054	-
33	LAIMIN	Leaf Area Index at zdatemin	0.051	-
34	FRACMAC	Fraction sorption sites macropores	0.043	+
35	LAIMAX	Max Leaf Area Index	0.037	-
36	FEXT	Canopy wash-off coefficient	0.029	+
37	ZMIX	Mixing depth	0.026	-
38	DV	Dispersivity	0.007	+
	TEMPINI	Initial soil temperature	0	
	DFORM	Form factor	0	
	LAIHAR	Leaf Area Index at harvest	0	
	ZHMIN	Crop height at zdatemin	0	

Appendix 21. Classification of MACRO input parameters according to their influence on pesticide losses for the *Pesticide L on Hodnet* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in pesticide losses

	Parameter	Description	MAROV	Influence
1	XMPOR	Boundary soil water content	0.856	-
2	RPIN	Root distribution	0.371	+
3	THETAINI	Initial soil moisture	0.320	+
4	WILT	Wilting point	0.300	+
5	ROOTMAX	Max root depth	0.280	-
6	TPORV	Saturated water content	0.236	-
7	ZALP	Correction factor for wet canopy evaporation	0.133	-
8	CTEN	Boundary soil water tension	0.095	-
9	ZLAMB	Pore size distribution index	0.054	-
10	BETA	Root adaptability factor	0.054	+
11	ZN	Pore size distribution factor macropores	0.049	-
12	GAMMA	Bulk density	0.021	-
13	LAIMAX	Max Leaf Area Index	0.018	-
14	KSATMIN	Saturated hydraulic conductivity	0.015	+
15	RINTEN	Rainfall intensity	0.007	+
16	WATEN	Critical water tension for root water uptake	0.005	-
17	ZM	Tortuosity factor micropores	0.005	+
18	KSM	Boundary hydraulic conductivity	0.005	+
19	CFORM	Form factor	0.004	+
20	ROOTINIT	Root Depth at zdatemin	0.003	-
21	CANCAP	Canopy Interception Capacity	0.002	-
22	LAIMIN	Leaf Area Index at zdatemin	0.002	-
23	ASCALE	Effective diffusion pathlength	0.002	-
24	CRITAIR	Critical soil air content for root water uptake	0.001	+
25	ZFINT	Fraction of irrigation intercepted by canopy	<0.001	+
	ANNAMP	Temperature annual amplitude	0	
	ANNTAV	Average annual temperature	0	
	TEMPINI	Initial soil temperature	0	
	DIFF	Diffusion coefficient in water	0	
	DV	Dispersivity	0	
	ZMIX	Mixing depth	0	
	CANDEG	Canopy degradation rate	0	
	DEG	degradation rates	0	
	EXPB	Exponent moisture relation	0	
	FEXT	Canopy wash-off coefficient	0	
	FRACMAC	Fraction sorption sites macropores	0	
	FREUND	Freundlich exponent	0	
	TRESP	Exponent Temperature response	0	
	ZKD	Sorption coefficient	0	
	DFORM	Form factor	0	
	LAIHAR	Leaf Area Index at harvest	0	
	ZHMIN	Crop height at zdatemin	0	

Appendix 22. Classification of MACRO input parameters according to their influence on percolation results for the *Pesticide T on Hodnet* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in percolation

	Parameter	Description	MAROV	Influence
1	TPORV	Saturated water content	6.675	-
2	ZN	Pore size distribution factor macropores	2.739	-
3	XMPOR	Boundary soil water content	2.273	+
4	FREUND	Freundlich exponent	2.070	+
5	KSM	Boundary hydraulic conductivity	1.619	-
6	ASCALE	Effective diffusion pathlength	1.504	+
7	DEG	degradation rates	1.218	-
8	DIFF	Diffusion coefficient in water	0.826	-
9	TRESP	Exponent Temperature response	0.722	+
10	ZKD	Sorption coefficient	0.633	-
11	KSATMIN	Saturated hydraulic conductivity	0.549	+
12	GAMMA	Bulk density	0.448	-
13	ANNTAV	Average annual temperature	0.406	-
14	ZLAMB	Pore size distribution index	0.341	-
15	ROOTMAX	Max root depth	0.290	-
16	CTEN	Boundary soil water tension	0.272	-
17	WILT	Wilting point	0.255	+
18	FRACMAC	Fraction sorption sites macropores	0.245	-
19	RPIN	Root distribution	0.211	+
20	ZALP	Correction factor for wet canopy evaporation	0.146	-
21	ZMIX	Mixing depth	0.137	+
22	ANNAMP	Temperature annual amplitude	0.128	+
23	RINTEN	Rainfall intensity	0.124	+
24	ZFINT	Fraction of irrigation intercepted by canopy	0.067	-
25	WATEN	Critical water tension for root water uptake	0.065	-
26	DV	Dispersivity	0.053	-
27	CANDEG	Canopy degradation rate	0.052	-
28	ROOTINIT	Root Depth at zdatemin	0.051	-
29	FEXT	Canopy wash-off coefficient	0.046	+
30	LAIMAX	Max Leaf Area Index	0.041	-
31	BETA	Root adaptability factor	0.038	+
32	CFORM	Form factor	0.035	+
33	EXPB	Exponent moisture relation	0.034	+
34	CRITAIR	Critical soil air content for root water uptake	0.033	-
35	CANCAP	Canopy Interception Capacity	0.029	-
36	ZM	Tortuosity factor micropores	0.023	+
37	LAIMIN	Leaf Area Index at zdatemin	0.022	-
38	THETAINI	Initial soil moisture	0.012	+
	TEMPINI	Initial soil temperature	0	
	DFORM	Form factor	0	
	LAIHAR	Leaf Area Index at harvest	0	
	ZHMIN	Crop height at zdatemin	0	

Appendix 23. Classification of MACRO input parameters according to their influence on pesticide losses for the *Pesticide T on Hodnet* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in pesticide losses

		Wick		Hodnet	
		Pesticide L	Pesticide T	Pesticide L	Pesticide T
ANNAMP	Temp annual amplitude	0	0	0	0
ANNTAV	Average annual temp	0	0	0	0
RINTEN	Rainfall intensity	0.009	0.009	0.007	0.007
TEMPINI	Initial soil temp	0	0	0	0
THETAINI	Initial soil moisture	0.181	0.181	0.320	0.320
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
ASCALE	Effective diffusion pathlength	0.002	0.002	0.002	0.002
CTEN	Boundary soil water tension	0.113	0.113	0.095	0.095
GAMMA	Bulk density	0.012	0.012	0.021	0.021
KSATMIN	Saturated hydraulic conductivity	0.004	0.004	0.015	0.015
KSM	Boundary hydraulic conductivity	0.042	0.042	0.005	0.005
TPORV	Saturated water content	0.034	0.034	0.236	0.236
WILT	Wilting point	0.153	0.153	0.300	0.300
XMPOR	Boundary soil water content	0.728	0.728	0.856	0.856
ZLAMB	Pore size distribution index	0.114	0.114	0.054	0.054
ZM	Tortuosity factor micropores	0.008	0.008	0.005	0.005
ZN	Pore size distribution factor macropores	0.014	0.014	0.049	0.049
BETA	Root adaptability factor	0.033	0.033	0.054	0.054
CANCAP	Canopy Interception Capacity	0.003	0.003	0.002	0.002
CFORM	Form factor	0.002	0.002	0.004	0.004
CRITAIR	Critical soil air content for root water uptake	0	0	0.00	0.00
DFORM	Form factor	0	0	0	0
LAIHAR	Leaf Area Index at harvest	0	0	0	0
LAIMAX	Max Leaf Area Index	0.011	0.011	0.018	0.018
LAIMIN	Leaf Area Index at zdatemin	0.001	0.001	0.002	0.002
ROOTINIT	Root Depth at zdatemin	0.003	0.003	0.003	0.003
ROOTMAX	Max root depth	0.226	0.226	0.280	0.280
RPIN	Root distribution	0.274	0.274	0.371	0.371
WATEN	Critical water tension for root water uptake	0.013	0.013	0.005	0.005
ZALP	Correction factor for wet canopy evaporation	0.122	0.122	0.133	0.133
ZHMIN	Crop height at zdatemin	0	0	0	0
ZFINT	Fraction of irrigation intercepted by canopy	0.000	0.000	0.000	0.000

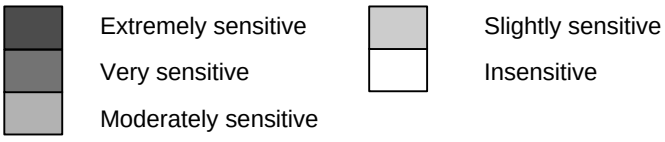
Appendix 24. Sensitivity indices (MAROV values) of MACRO parameters with regard to percolation for the four scenarios

		Wick		Hodnet		
		Pesticide L	Pesticide T	Pesticide L	Pesticide T	Influence
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 macropores	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	

Appendix 25. Classification of MACRO parameters according to their influence on percolation (values presented are MAROV)

A positive (resp. negative) influence means that an increase in the value of the parameter will result in an increase (resp. decrease) in percolation

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



		Wick		Hodnet	
		Pesticide L	Pesticide T	Pesticide L	Pesticide T
XMPOR	Boundary soil water content	1	1	1	1
RPIN	Root distribution	2	2	2	2
THETAINI	Initial soil moisture	4	4	3	3
ROOTMAX	Max root depth	3	3	5	5
WILT	Wilting point	5	5	4	4
TPORV	Saturated water content	10	10	6	6
ZALP	Correction factor for wet canopy evaporation	6	6	7	7
CTEN	Boundary soil water tension	8	8	8	8
ZLAMB	Pore size distribution index	7	7	9	9
BETA	Root adaptability factor	11	11	10	10
ZN	Pore size distribution factor macropores	12	12	11	11
GAMMA	Bulk density	14	14	12	12
KSM	Boundary hydraulic conductivity	9	9	18	18
LAIMAX	Max Leaf Area Index	15	15	13	13
KSATMIN	Saturated hydraulic conductivity	18	18	14	14
WATEN	Critical water tension for root water uptake	13	13	16	16
RINTEN	Rainfall intensity	16	16	15	15
ZM	Tortuosity factor micropores	17	17	17	17
CFORM	Form factor	21	21	19	19
ROOTINIT	Root Depth at zdatemin	19	19	20	20
CANCAP	Canopy Interception Capacity	20	20	21	21
ASCALE	Effective diffusion pathlength	22	22	23	23
LAIMIN	Leaf Area Index at zdatemin	23	23	22	22
CRITAIR	Critical soil air content for root water uptake	-	-	24	24
ZFINT	Fraction of irrigation intercepted by canopy	24	24	25	25
ANNAMP	Temp annual amplitude	-	-	-	-
ANNTAV	Average annual temp	-	-	-	-
TEMPINI	Initial soil temp	-	-	-	-
DIFF	Diffusion coefficient in water	-	-	-	-
DV	Dispersivity	-	-	-	-
ZMIX	Mixing depth	-	-	-	-
CANDEG	Canopy degradation rate	-	-	-	-
DEG	Degradation rates	-	-	-	-
EXPB	Exponent moisture relation	-	-	-	-
FEXT	Canopy wash-off coefficient	-	-	-	-
FRACMAC	Fraction sorption sites macropores	-	-	-	-
FREUND	Freundlich exponent	-	-	-	-
TRESP	Exponent Temp response	-	-	-	-
ZKD	Sorption coefficient	-	-	-	-
DFORM	Form factor	-	-	-	-
LAIHAR	Leaf Area Index at harvest	-	-	-	-
ZHMIN	Crop height at zdatemin	-	-	-	-

Appendix 26. Ranking of MACRO input parameters as a function of their influence on percolation results
Parameters with the lowest ranking have the largest influence on percolation and vice versa

		Wick		Hodnet	
		Pesticide L	Pesticide T	Pesticide L	Pesticide T
ANNAMP	Temp annual amplitude	0.568	0.362	0.222	0.128
ANNTAV	Average annual temp	1.823	2.231	0.597	0.406
RINTEN	Rainfall intensity	0.232	0.950	0.091	0.124
TEMPINI	Initial soil temp	0	0	0	0
THETAINI	Initial soil moisture	0.085	0.141	0.152	0.012
DIFF	Diffusion coefficient in water	0.019	0.067	0.302	0.826
DV	Dispersivity	0.134	0.050	0.007	0.053
ZMIX	Mixing depth	0.082	0.218	0.026	0.137
CANDEG	Canopy degradation rate	0.070	0.062	0.122	0.052
DEG	Degradation rates	8.157	11.942	3.097	1.218
EXPB	Exponent moisture relation	0.507	0.855	0.056	0.034
FEXT	Canopy wash-off coefficient	0.026	0.054	0.029	0.046
FRACMAC	Fraction sorption sites macropores	0.023	0.481	0.043	0.245
FREUND	Freundlich exponent	4.552	22.211	1.348	2.070
TRESP	Exponent Temp response	3.488	3.369	1.765	0.722
ZKD	Sorption coefficient	4.496	12.129	0.242	0.633
ASCALE	Effective diffusion pathlength	0.247	0.873	0.692	1.504
CTEN	Boundary soil water tension	0.085	0.868	0.069	0.272
GAMMA	Bulk density	2.363	3.680	0.067	0.448
KSATMIN	Saturated hydraulic conductivity	0.147	0.631	0.267	0.549
KSM	Boundary hydraulic conductivity	0.389	7.000	1.247	1.619
TPORV	Saturated water content	0.524	5.895	2.696	6.675
WILT	Wilting point	0.125	0.248	0.363	0.255
XMPOR	Boundary soil water content	2.469	0.948	0.938	2.273
ZLAMB	Pore size distribution index	0.829	1.450	0.456	0.341
ZM	Tortuosity factor micropores	0.113	0.112	0.065	0.023
ZN	Pore size distribution factor macropores	0.131	5.615	0.818	2.739
BETA	Root adaptability factor	0.132	0.119	0.112	0.038
CANCAP	Canopy Interception Capacity	0.183	0.126	0.126	0.029
CFORM	Form factor	0.050	0.064	0.054	0.035
CRITAIR	Critical soil air content for root water uptake	0	0	0.092	0.033
DFORM	Form factor	0	0	0	0
LAIHAR	Leaf Area Index at harvest	0	0	0	0
LAIMAX	Max Leaf Area Index	0.092	0.053	0.037	0.041
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
ROOTMAX	Max root depth	0.188	0.336	0.366	0.290
RPIN	Root distribution	0.157	0.414	0.322	0.211
WATEN	Critical water tension for root water uptake	0.132	0.080	0.136	0.065
ZALP	Correction factor for wet canopy evaporation	0.276	0.293	0.101	0.146
ZHMIN	Crop height at zdatemin	0	0	0	0
ZFINT	Fraction of irrigation intercepted by canopy	0.193	0.165	0.104	0.067

Appendix 27. Sensitivity indices (MAROV values) of MACRO parameters with regard to total pesticide losses for the four scenarios

		Wick		Hodnet		
		Pesticide L	Pesticide T	Pesticide L	Pesticide T	Influence
FREUND	Freundlich exponent	4.552	22.211	1.348	2.070	+
DEG	Degradation rates	8.157	11.942	3.097	1.218	-
ZKD	Sorption coefficient	4.496	12.129	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 macropores	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 content 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	

Appendix 28. Classification of MACRO parameters according to their influence on pesticide losses (values presented are MAROV)

A positive (resp. negative) influence means that an increase in the value of the parameter will result in an increase (resp. decrease) in pesticide losses

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

Extremely sensitive

Very sensitive

Moderately sensitive

Slightly sensitive

Insensitive

		Wick		Hodnet	
		Pesticide L	Pesticide T	Pesticide L	Pesticide T
FREUND	Freundlich exponent	2	1	4	4
DEG	Degradation rates	1	3	1	7
ZKD	Sorption coefficient	3	2	16	10
TPORV	Saturated water content	10	5	2	1
KSM	Boundary hydraulic conductivity	12	4	5	5
TRESP	Exponent Temp response	4	8	3	9
ZN	Pore size distribution factor macropores	24	6	7	2
XMPOR	Boundary soil water content	5	12	6	3
GAMMA	Bulk density	6	7	28	12
ANNTAV	Average annual temp	7	9	9	13
ASCALE	Effective diffusion pathlength	14	13	8	6
ZLAMB	Pore size distribution index	8	10	10	14
KSATMIN	Saturated hydraulic conductivity	20	16	15	11
EXPB	Exponent moisture relation	11	15	31	33
RINTEN	Rainfall intensity	15	11	26	23
CTEN	Boundary soil water tension	28	14	27	16
ANNAMP	Temp annual amplitude	9	19	17	22
DIFF	Diffusion coefficient in water	37	32	14	8
ROOTMAX	Max root depth	17	20	11	15
RPIN	Root distribution	19	18	13	19
WILT	Wilting point	25	22	12	17
ZALP	Correction factor for wet canopy evaporation	13	21	24	20
FRACMAC	Fraction sorption sites macropores	36	17	34	18
ZFINT	Fraction of irrigation intercepted by canopy	16	24	23	24
ZMIX	Mixing depth	30	23	37	21
CANCAP	Canopy Interception Capacity	18	26	20	35
WATEN	Critical water tension for root water uptake	23	31	19	25
BETA	Root adaptability factor	22	27	22	31
THETAINI	Initial soil moisture	29	25	18	38
ZM	Tortuosity factor micropores	26	28	29	36
CANDEG	Canopy deg rate	32	34	21	27
LAIMIN	Leaf Area Index at zdatemin	31	29	33	37
ROOTINIT	Root Depth at zdatemin	33	30	30	28
DV	Dispersivity	21	37	38	26
LAIMAX	Max Leaf Area Index	27	36	35	30
CFORM	Form factor	34	33	32	32
FEXT	Canopy wash-off coefficient	35	35	36	29
CRITAIR	Critical soil air content for root water uptake	-	-	25	34
TEMPINI	Initial soil temp	-	-	-	-
DFORM	Form factor	-	-	-	-
LAIHAR	Leaf Area Index at harvest	-	-	-	-
ZHMIN	Crop height at zdatemin	-	-	-	-

Appendix 29. Ranking of MACRO input parameters as a function of their influence on pesticide losses
Parameters with the lowest ranking have the largest influence on pesticide losses and vice versa

Parameter MLW	Description	Distribution	Mean	Variance	Min	Max
Site parameters						
ANNAMP	Temperature annual amplitude	Normal	8	1.04	6	10
ANNTAV	Average annual temperature	Normal	8	1.04	6	10
RINTEN	Rainfall intensity	Log-normal	2	4.50e-1	1	4
Initial/Boundary conditions						
TEMPINI	Initial soil temperature	Normal	8	1.04	6	10
THETAINI	Initial soil moisture	Normal	27.75	1.25e1	20.81	34.69
Solute transport						
DIFF	Diffusion coefficient in water	Normal	4.6E-10	3.52e-20	9.2E-11	8.3E-10
DV	Dispersivity	Log-normal	1	6.26e-1	0.2	2.6
FSTAR	Solute concentration factor	Normal	0.5	6.51e-2	0	1
ZMIX	Mixing depth	Log-normal	1	4.54e-1	0.25	2.5
Pesticide parameters						
CANDEG	Canopy degradation rate	Log-normal	0.0893	8.97e-4	0.0446	0.1786
DEG	Degradation rates	Log-normal	0.0893	8.97e-4	0.0446	0.1786
EXPB	Exponent moisture relation	Normal	0.7	2.04e-2	0.42	0.98
FEXT	Canopy wash-off coefficient	Log-normal	0.01	1.12e-5	0.005	0.02
FRACMAC	Fraction sorption sites in macropores	Log-normal	0.02	1.82e-4	0.005	0.05
FREUND	Freundlich exponent	Normal	0.9	8.43e-3	0.72	1.08
TRESP	Exponent temperature response	Normal	0.08	1.04e-4	0.06	0.1
ZKD	Sorption coefficient	Log-normal	0.34	1.30e-2	0.17	0.68
Physical/Hydraulic parameters						
ASCALE	Effective diffusion pathlength	Log-normal	20	4.50e1	10	40
CTEN	Boundary soil water tension	Log-normal	10	1.12e1	5	20
GAMMA	Bulk density	Normal	1.35	4.74e-3	1.21	1.49
KSATMIN	Saturated hydraulic conductivity	Log-normal	120	1.62e3	60	240
KSM	Boundary hydraulic conductivity	Normal	0.492	1.57e-2	0.246	0.740
TPORV	Saturated water content	Normal	46.56	5.64	41.90	51.22
WILT	Wilting point	Normal	10.54	2.89e-1	9.49	11.59
XMPOR	Boundary soil water content	Normal	35.71	3.32	32.14	39.28
ZLAMB	Pore size distribution index	Log-normal	0.163	2.99e-3	0.0815	0.3260
ZM	Tortuosity factor micropores	Log-normal	0.5	2.81e-2	0.25	1
ZN	Pore size distribution factor macropores	Normal	4.4	5.16e-1	3.0	5.8
Crop parameters						
BETA	Root adaptability factor	Log-normal	0.2	4.50e-3	0.1	0.4
CANCAP	Canopy Interception Capacity	Log-normal	2	4.50e-1	1	4
CFORM	Form factor	Normal	1.7	2.34e-2	1.4	2.0
CRITAIR	Critical soil air content for root water uptake	Normal	5	2.34	2	8
DFORM	Form factor	Normal	0.7	2.60e-3	0.6	0.8
LAIHAR	Leaf Area Index at harvest	Log-normal	1	1.12e-1	0.5	2
LAIMAX	Maximum Leaf Area Index	Normal	6.2	2.60e-1	5.2	7.2
LAIMIN	Leaf Area Index at zdatemin	Normal	1	6.51e-2	0.5	1.5
ROOTINIT	Root Depth at zdatemin	Normal	0.2	2.60e-3	0.1	0.3
ROOTMAX	Maximum root depth	Normal	0.8	1.04e-2	0.6	1

RPIN	Root distribution	Normal	70	2.60e1	60	80
WATEN	Critical water tension for root water uptake	Uniform	-	-	1	20
ZALP	Correction factor for wet canopy evaporation	Uniform	-	-	1	1.3
ZHMIN	Crop height at zdatemin	Normal	0.15	6.50e-4	0.1	0.2
Irrigation						
ZFINT	Fraction of irrigation intercepted by canopy	Log-normal	0.1	1.12e-3	0.05	0.2

Appendix 30. Parameterisation of probability distribution functions for MACRO input parameters for the Monte Carlo approach (*Pesticide L on Wick* scenario)

Parameter MTW	Description	Distribution	Mean	Standard dev.	Min	Max
Site parameters						
ANNAMP	Temperature annual amplitude	Normal	8	1.04	6	10
ANNTAV	Average annual temperature	Normal	8	1.04	6	10
RINTEN	Rainfall intensity	Log-normal	2	4.50e-1	1	4
Initial/Boundary conditions						
TEMPINI	Initial soil temperature	Normal	8	1.04	6	10
THETAINI	Initial soil moisture	Normal	27.75	1.25e1	20.81	34.69
Solute transport						
DIFF	Diffusion coefficient in water	Normal	4.6E-10	3.52e-20	9.2E-11	8.3E-10
DV	Dispersivity	Log-normal	1	6.26e-1	0.2	2.6
FSTAR	Solute concentration factor	Normal	0.5	6.51e-2	0	1
ZMIX	Mixing depth	Log-normal	1	4.54e-1	0.25	2.5
Pesticide parameters						
CANDEG	Canopy degradation rate	Log-normal	0.0298	9.99e-5	0.0149	0.0596
DEG	Degradation rates	Log-normal	0.0298	9.99e-5	0.0149	0.0596
EXPB	Exponent moisture relation	Normal	0.7	2.04e-2	0.42	0.98
FEXT	Canopy wash-off coefficient	Log-normal	0.01	1.12e-5	0.005	0.02
FRACMAC	Fraction sorption sites in macropores	Log-normal	0.02	1.82e-4	0.005	0.05
FREUND	Freundlich exponent	Normal	0.9	8.43e-3	0.72	1.08
TRESP	Exponent temperature response	Normal	0.08	1.04e-4	0.06	0.1
ZKD	Sorption coefficient	Log-normal	1.7	3.25e-1	0.85	3.4
Physical/Hydraulic parameters						
ASCALE	Effective diffusion pathlength	Log-normal	20	4.50e1	10	40
CTEN	Boundary soil water tension	Log-normal	10	1.12e1	5	20
GAMMA	Bulk density	Normal	1.35	4.74e-3	1.21	1.49
KSATMIN	Saturated hydraulic conductivity	Log-normal	120	1.62e3	60	240
KSM	Boundary hydraulic conductivity	Normal	0.492	1.57e-2	0.246	0.740
TPORV	Saturated water content	Normal	46.56	5.64	41.90	51.22
WILT	Wilting point	Normal	10.54	2.89e-1	9.49	11.59
XMPOR	Boundary soil water content	Normal	35.71	3.32	32.14	39.28
ZLAMB	Pore size distribution index	Log-normal	0.163	2.99e-3	0.0815	0.3260
ZM	Tortuosity factor micropores	Log-normal	0.5	2.81e-2	0.25	1
ZN	Pore size distribution factor macropores	Normal	4.4	5.16e-1	3.0	5.8
Crop parameters						
BETA	Root adaptability factor	Log-normal	0.2	4.50e-3	0.1	0.4
CANCAP	Canopy Interception Capacity	Log-normal	2	4.50e-1	1	4
CFORM	Form factor	Normal	1.7	2.34e-2	1.4	2.0
CRITAIR	Critical soil air content for root water uptake	Normal	5	2.34	2	8
DFORM	Form factor	Normal	0.7	2.60e-3	0.6	0.8
LAIHAR	Leaf Area Index at harvest	Log-normal	1	1.12e-1	0.5	2
LAIMAX	Maximum Leaf Area Index	Normal	6.2	2.60e-1	5.2	7.2
LAIMIN	Leaf Area Index at zdatemin	Normal	1	6.51e-2	0.5	1.5
ROOTINIT	Root Depth at zdatemin	Normal	0.2	2.60e-3	0.1	0.3

ROOTMAX	Maximum root depth	Normal	0.8	1.04e-2	0.6	1
RPIN	Root distribution	Normal	70	2.60e1	60	80
WATEN	Critical water tension for root water uptake	Uniform	-	-	1	20
ZALP	Correction factor for wet canopy evaporation	Uniform	-	-	1	1.3
ZHMIN	Crop height at zdatemin	Normal	0.15	6.50e-4	0.1	0.2
Irrigation						
ZFINT	Fraction of irrigation intercepted by canopy	Log-normal	0.1	1.12e-3	0.05	0.2

Appendix 31. Parameterisation of probability distribution functions for MACRO input parameters for the Monte Carlo approach (*Pesticide T on Wick* scenario)

Parameter MLH	Description	Distribution	Mean	Standard dev.	Min	Max
Site parameters						
ANNAMP	Temperature annual amplitude	Normal	8	1.04	6	10
ANNTAV	Average annual temperature	Normal	8	1.04	6	10
RINTEN	Rainfall intensity	Log-normal	2	4.50e-1	1	4
Initial/Boundary conditions						
TEMPINI	Initial soil temperature	Normal	8	1.04	6	10
THETAINI	Initial soil moisture	Normal	34.9	1.98e1	26.17	43.62
Solute transport						
DIFF	Diffusion coefficient in water	Normal	4.6E-10	3.52e-20	9.2E-11	8.3E-10
DV	Dispersivity	Log-normal	1	6.26e-1	0.2	2.6
FSTAR	Solute concentration factor	Normal	0.5	6.51e-2	0	1
ZMIX	Mixing depth	Log-normal	1	4.54e-1	0.25	2.5
Pesticide parameters						
CANDEG	Canopy degradation rate	Log-normal	0.0893	8.97e-4	0.0446	0.1786
DEG	Degradation rates	Log-normal	0.0893	8.97e-4	0.0446	0.1786
EXPB	Exponent moisture relation	Normal	0.7	2.04e-2	0.42	0.98
FEXT	Canopy wash-off coefficient	Log-normal	0.01	1.12e-5	0.005	0.02
FRACMAC	Fraction sorption sites in macropores	Log-normal	0.02	1.82e-4	0.005	0.05
FREUND	Freundlich exponent	Normal	0.9	8.43e-3	0.72	1.08
TRESP	Exponent temperature response	Normal	0.08	1.04e-4	0.06	0.1
ZKD	Sorption coefficient	Log-normal	0.23	5.95e-3	0.115	0.460
Physical/Hydraulic parameters						
ASCALE	Effective diffusion pathlength	Log-normal	20	4.50e1	10	40
CTEN	Boundary soil water tension	Log-normal	18	3.64e1	9	36
GAMMA	Bulk density	Normal	1.39	5.03-3	1.25	1.52
KSATMIN	Saturated hydraulic conductivity	Log-normal	39.25	1.73e2	19.62	78.5
KSM	Boundary hydraulic conductivity	Normal	0.088	5.04e-4	0.044	0.132
TPORV	Saturated water content	Normal	46.8	5.70	42.12	51.48
WILT	Wilting point	Normal	16.8	7.35e-1	15.12	18.48
XMPOR	Boundary soil water content	Normal	38.74	3.91	34.87	42.61
ZLAMB	Pore size distribution index	Log-normal	0.084	7.94e-4	0.042	0.168
ZM	Tortuosity factor micropores	Log-normal	0.5	2.81e-2	0.25	1
ZN	Pore size distribution factor macropores	Normal	4.92	6.45e-1	3.35	6.49
Crop parameters						
BETA	Root adaptability factor	Log-normal	0.2	4.50e-3	0.1	0.4
CANCAP	Canopy Interception Capacity	Log-normal	2	4.50e-1	1	4
CFORM	Form factor	Normal	1.7	2.34e-2	1.4	2.0
CRITAIR	Critical soil air content for root water uptake	Normal	5	2.34	2	8
DFORM	Form factor	Normal	0.7	2.60e-3	0.6	0.8
LAIHAR	Leaf Area Index at harvest	Log-normal	1	1.12e-1	0.5	2
LAIMAX	Maximum Leaf Area Index	Normal	6.2	2.60e-1	5.2	7.2
LAIMIN	Leaf Area Index at zdatemin	Normal	1	6.51e-2	0.5	1.5
ROOTINIT	Root Depth at zdatemin	Normal	0.2	2.60e-3	0.1	0.3

ROOTMAX	Maximum root depth	Normal	0.8	1.04e-2	0.6	1
RPIN	Root distribution	Normal	70	2.60e1	60	80
WATEN	Critical water tension for root water uptake	Uniform	-	-	1	20
ZALP	Correction factor for wet canopy evaporation	Uniform	-	-	1	1.3
ZHMIN	Crop height at zdatemin	Normal	0.15	6.50e-4	0.1	0.2
Irrigation						
ZFINT	Fraction of irrigation intercepted by canopy	Log-normal	0.1	1.12e-3	0.05	0.2

Appendix 32. Parameterisation of probability distribution functions for MACRO input parameters for the Monte Carlo approach (*Pesticide L on Hodnet* scenario)

Parameter MLH	Description	Distribution	Mean	Standard dev.	Min	Max
Site parameters						
ANNAMP	Temperature annual amplitude	Normal	8	1.04	6	10
ANNTAV	Average annual temperature	Normal	8	1.04	6	10
RINTEN	Rainfall intensity	Log-normal	2	4.50e-1	1	4
Initial/Boundary conditions						
TEMPINI	Initial soil temperature	Normal	8	1.04	6	10
THETAINI	Initial soil moisture	Normal	34.9	1.98e1	26.17	43.62
Solute transport						
DIFF	Diffusion coefficient in water	Normal	4.6E-10	3.52e-20	9.2E-11	8.3E-10
DV	Dispersivity	Log-normal	1	6.26e-1	0.2	2.6
FSTAR	Solute concentration factor	Normal	0.5	6.51e-2	0	1
ZMIX	Mixing depth	Log-normal	1	4.54e-1	0.25	2.5
Pesticide parameters						
CANDEG	Canopy degradation rate	Log-normal	0.0298	9.99e-5	0.0149	0.0596
DEG	Degradation rates	Log-normal	0.0298	9.99e-5	0.0149	0.0596
EXPB	Exponent moisture relation	Normal	0.7	2.04e-2	0.42	0.98
FEXT	Canopy wash-off coefficient	Log-normal	0.01	1.12e-5	0.005	0.02
FRACMAC	Fraction sorption sites in macropores	Log-normal	0.02	1.82e-4	0.005	0.05
FREUND	Freundlich exponent	Normal	0.9	8.43e-3	0.72	1.08
TRESP	Exponent temperature response	Normal	0.08	1.04e-4	0.06	0.1
ZKD	Sorption coefficient	Log-normal	1.15	1.49e-1	0.575	2.3
Physical/Hydraulic parameters						
ASCALE	Effective diffusion pathlength	Log-normal	20	4.50e1	10	40
CTEN	Boundary soil water tension	Log-normal	18	3.64e1	9	36
GAMMA	Bulk density	Normal	1.39	5.03-3	1.25	1.52
KSATMIN	Saturated hydraulic conductivity	Log-normal	39.25	1.73e2	19.62	78.5
KSM	Boundary hydraulic conductivity	Normal	0.088	5.04e-4	0.044	0.132
TPORV	Saturated water content	Normal	46.8	5.70	42.12	51.48
WILT	Wilting point	Normal	16.8	7.35e-1	15.12	18.48
XMPOR	Boundary soil water content	Normal	38.74	3.91	34.87	42.61
ZLAMB	Pore size distribution index	Log-normal	0.084	7.94e-4	0.042	0.168
ZM	Tortuosity factor micropores	Log-normal	0.5	2.81e-2	0.25	1
ZN	Pore size distribution factor macropores	Normal	4.92	6.45e-1	3.35	6.49
Crop parameters						
BETA	Root adaptability factor	Log-normal	0.2	4.50e-3	0.1	0.4
CANCAP	Canopy Interception Capacity	Log-normal	2	4.50e-1	1	4
CFORM	Form factor	Normal	1.7	2.34e-2	1.4	2.0
CRITAIR	Critical soil air content for root water uptake	Normal	5	2.34	2	8
DFORM	Form factor	Normal	0.7	2.60e-3	0.6	0.8
LAIHAR	Leaf Area Index at harvest	Log-normal	1	1.12e-1	0.5	2
LAIMAX	Maximum Leaf Area Index	Normal	6.2	2.60e-1	5.2	7.2
LAIMIN	Leaf Area Index at zdatemin	Normal	1	6.51e-2	0.5	1.5
ROOTINIT	Root Depth at zdatemin	Normal	0.2	2.60e-3	0.1	0.3

ROOTMAX	Maximum root depth	Normal	0.8	1.04e-2	0.6	1
RPIN	Root distribution	Normal	70	2.60e1	60	80
WATEN	Critical water tension for root water uptake	Uniform	-	-	1	20
ZALP	Correction factor for wet canopy evaporation	Uniform	-	-	1	1.3
ZHMIN	Crop height at zdatemin	Normal	0.15	6.50e-4	0.1	0.2
Irrigation						
ZFINT	Fraction of irrigation intercepted by canopy	Log-normal	0.1	1.12e-3	0.05	0.2

Appendix 33. Parameterisation of probability distribution functions for MACRO input parameters for the Monte Carlo approach (*Pesticide T on Hodnet* scenario)

	Mean	Standard deviation	Variance	Min	Max
AMPA	8.0000	0.8901	0.7922	6.0100	9.9400
TAVA	7.9995	0.8907	0.7933	6.0100	9.9800
RINT	1.9998	0.5998	0.3598	1.0000	3.8600
TEM	8.0005	0.8899	0.7920	6.0500	9.9700
THE	27.7456	3.0922	9.5618	20.9000	34.7000
DIFF	4.60E-10	1.64E-10	2.69E-20	1.01E-10	8.20E-10
DV	0.9036	0.5263	0.2770	0.2020	2.5800
FSTA	0.5000	0.2229	0.0497	0.0039	0.9950
ZMIX	0.9351	0.4882	0.2383	0.2570	2.4600
CAND	0.0893	0.0268	0.0007	0.0451	0.1780
MAL	0.0893	0.0268	0.0007	0.0454	0.1740
EXPB	0.7000	0.1248	0.0156	0.4210	0.9780
FEXT	0.0100	0.0030	0.0000	0.0050	0.0197
FRAC	0.0187	0.0098	0.0001	0.0050	0.0497
FREU	0.9000	0.0801	0.0064	0.7210	1.0800
TRES	0.0800	0.0115	0.0001	0.0602	0.0999
ZKD	0.3400	0.1020	0.0104	0.1710	0.6580
ASC	20.0076	6.0279	36.3354	10.1000	39.5000
CTE	10.0023	3.0084	9.0506	5.0800	19.7000
GAM	1.3501	0.0602	0.0036	1.2200	1.4800
KSA	120.0336	36.1067	1303.6906	60.9000	236.0000
KSM	0.4921	0.1095	0.0120	0.2520	0.7350
TPO	46.5580	2.0690	4.2809	42.0000	51.1000
WIL	10.5403	0.4710	0.2218	9.5000	11.6000
XMP	35.7104	1.5901	2.5283	32.1000	39.3000
ZLA	0.1630	0.0489	0.0024	0.0830	0.3180
ZM	0.5001	0.1505	0.0227	0.2510	0.9910
ZN	4.4007	0.6256	0.3914	3.0200	5.7700
BETA	0.2000	0.0602	0.0036	0.1000	0.3980
CANC	2.0005	0.6016	0.3619	1.0100	3.9100
CFOR	1.7000	0.1335	0.0178	1.4100	1.9900
CRIT	5.0002	1.3370	1.7876	2.0400	7.9100
DFOR	0.7000	0.0445	0.0020	0.6010	0.7990
LAIH	0.9998	0.3001	0.0900	0.5090	1.9600
LAIX	6.2000	0.4455	0.1985	5.2300	7.1700
LAIN	1.0000	0.2229	0.0497	0.5060	1.5000
RINI	0.2000	0.0445	0.0020	0.1030	0.3000
RMAX	0.8000	0.0889	0.0079	0.6050	0.9940
RPIN	70.0000	4.4541	19.8392	60.0000	79.8000
WATE	10.5016	5.4940	30.1837	1.0100	19.9000
ZALP	1.1500	0.0866	0.0075	1.0000	1.3000
ZHMI	0.1500	0.0222	0.0005	0.1010	0.1990
ZFIN	0.1000	0.0300	0.0009	0.0504	0.1930

Appendix 34. Statistics for MACRO input parameters as generated by Monte Carlo sampling *(Pesticide L on Wick scenario)*

	Mean	Standard deviation	Variance	Min	Max
AMPA	8.0012	0.8913	0.7945	6.0200	10.0000
TAVA	8.0006	0.8911	0.7940	6.0200	9.9900
RINT	2.0010	0.6021	0.3625	1.0100	3.9900
TEM	7.9999	0.8906	0.7931	6.0600	9.9600
THE	27.7548	3.0884	9.5379	20.9000	34.6000
DIFF	4.60E-10	1.64E-10	2.69E-20	9.80E-11	8.23E-10
DV	0.9043	0.5274	0.2781	0.2020	2.5900
FSTA	0.5000	0.2228	0.0496	0.0091	0.9940
ZMIX	0.9348	0.4880	0.2382	0.2590	2.4600
CAND	0.0298	0.0090	0.0001	0.0151	0.0584
MAL	0.0298	0.0090	0.0001	0.0151	0.0586
EXPB	0.7000	0.1247	0.0155	0.4210	0.9720
FEXT	0.0100	0.0030	0.0000	0.0051	0.0197
FRAC	0.0187	0.0098	0.0001	0.0050	0.0488
FREU	0.9001	0.0803	0.0065	0.7250	1.0800
TRES	0.0800	0.0115	0.0001	0.0601	0.0999
ZKD	1.7009	0.5126	0.2628	0.8660	3.4000
ASC	20.0008	6.0071	36.0848	10.1000	39.7000
CTE	10.0000	3.0013	9.0078	5.0200	19.6000
GAM	1.3504	0.0602	0.0036	1.2200	1.4800
KSA	120.0840	36.1268	1305.1435	60.0000	233.0000
KSM	0.4921	0.1096	0.0120	0.2460	0.7320
TPO	46.5668	2.0757	4.3087	42.0000	51.2000
WIL	10.5441	0.4708	0.2217	9.5100	11.6000
XMP	35.7168	1.5912	2.5319	32.3000	39.3000
ZLA	0.1631	0.0491	0.0024	0.0829	0.3250
ZM	0.4999	0.1499	0.0225	0.2540	0.9680
ZN	4.4006	0.6258	0.3916	3.0300	5.8000
BETA	0.2001	0.0602	0.0036	0.1020	0.3960
CANC	2.0005	0.6018	0.3621	1.0100	3.9800
CFOR	1.7006	0.1336	0.0178	1.4000	1.9900
CRIT	5.0007	1.3342	1.7801	2.0900	7.9600
DFOR	0.7000	0.0445	0.0020	0.6000	0.7970
LAIH	1.0001	0.3002	0.0901	0.5010	1.9300
LAIX	6.2004	0.4455	0.1985	5.2100	7.1700
LAIN	1.0003	0.2230	0.0497	0.5120	1.4900
RINI	0.2000	0.0446	0.0020	0.1010	0.2980
RMAX	0.8000	0.0890	0.0079	0.6060	0.9950
RPIN	70.0048	4.4543	19.8412	60.1000	79.8000
WATE	10.5082	5.5007	30.2580	1.0200	20.0000
ZALP	1.1505	0.0869	0.0076	1.0000	1.3000
ZHMI	0.1501	0.0223	0.0005	0.1010	0.2000
ZFIN	0.1000	0.0300	0.0009	0.0510	0.1960

Appendix 35. Statistics for MACRO input parameters as generated by Monte Carlo sampling *(Pesticide T on Wick scenario)*

	Mean	Standard deviation	Variance	Min	Max
AMPA	7.9995	0.8916	0.7949	6.0200	9.9500
TAVA	8.0002	0.8906	0.7933	6.0300	9.9600
RINT	1.9997	0.6009	0.3611	1.0100	3.8800
TEM	8.0003	0.8900	0.7922	6.0300	9.9800
THE	34.9028	3.8842	15.0867	26.4000	43.5000
DIFF	4.60E-10	1.64E-10	2.69E-20	9.34E-11	8.27E-10
DV	0.9039	0.5267	0.2774	0.2040	2.5500
FSTA	0.5000	0.2223	0.0494	0.0071	0.9880
ZMIX	0.9347	0.4879	0.2381	0.2550	2.4700
CAND	0.0893	0.0268	0.0007	0.0455	0.1770
MAL	0.0893	0.0269	0.0007	0.0448	0.1780
EXPB	0.7000	0.1247	0.0156	0.4220	0.9790
FEXT	0.0100	0.0030	0.0000	0.0050	0.0194
FRAC	0.0187	0.0098	0.0001	0.0050	0.0499
FREU	0.9000	0.0801	0.0064	0.7240	1.0800
TRES	0.0800	0.0115	0.0001	0.0602	0.0999
ZKD	0.2301	0.0692	0.0048	0.1170	0.4510
ASC	20.0060	6.0126	36.1516	10.2000	39.3000
CTE	17.9980	5.3948	29.1035	9.1600	34.7000
GAM	1.3898	0.0619	0.0038	1.2500	1.5200
KSA	39.2524	11.7920	139.0505	19.8000	77.5000
KSM	0.0880	0.0196	0.0004	0.0445	0.1320
TPO	46.7992	2.0839	4.3427	42.2000	51.4000
WIL	16.7992	0.7490	0.5610	15.1000	18.5000
XMP	38.7416	1.7227	2.9679	34.9000	42.6000
ZLA	0.0840	0.0253	0.0006	0.0424	0.1650
ZM	0.5000	0.1502	0.0226	0.2520	0.9840
ZN	4.9198	0.7013	0.4918	3.3500	6.4700
BETA	0.2000	0.0601	0.0036	0.1010	0.3950
CANC	1.9995	0.6003	0.3603	1.0000	3.9300
CFOR	1.7001	0.1334	0.0178	1.4100	2.0000
CRIT	4.9999	1.3343	1.7804	2.0900	7.9200
DFOR	0.7000	0.0445	0.0020	0.6010	0.7990
LAIH	1.0001	0.3006	0.0903	0.5090	1.9700
LAIX	6.2001	0.4455	0.1985	5.2200	7.1800
LAIN	1.0002	0.2226	0.0496	0.5130	1.5000
RINI	0.2000	0.0446	0.0020	0.1000	0.2980
RMAX	0.8000	0.0891	0.0079	0.6020	0.9990
RPIN	69.9952	4.4491	19.7942	60.3000	79.9000
WATE	10.4984	5.4956	30.2013	1.0200	19.9000
ZALP	1.1500	0.0869	0.0076	1.0000	1.3000
ZHMI	0.1500	0.0223	0.0005	0.1010	0.1990
ZFIN	0.1000	0.0300	0.0009	0.0510	0.1930

Appendix 36. Statistics for MACRO input parameters as generated by Monte Carlo sampling
(Pesticide L on Hodnet scenario)

	Mean	Standard deviation	Variance	Min	Max
AMPA	8.0001	0.8908	0.7935	6.0576	9.9418
TAVA	8.0017	0.8918	0.7953	6.0613	9.9491
RINT	1.9985	0.6018	0.3621	1.0188	3.8608
TEM	8.0006	0.8906	0.7933	6.0472	9.9768
THE	34.8700	3.8509	14.8298	26.3675	43.4348
DIFF	4.62E-10	1.65E-10	2.71E-20	9.34E-11	8.18E-10
DV	0.9021	0.5263	0.2770	0.2084	2.5426
FSTA	0.4999	0.2225	0.0495	0.0071	0.9954
ZMIX	0.9368	0.4879	0.2380	0.2571	2.4744
CAND	0.0299	0.0091	0.0001	0.0151	0.0580
MAL	0.0298	0.0089	0.0001	0.0149	0.0577
EXPB	0.7001	0.1247	0.0155	0.4285	0.9743
FEXT	0.0100	0.0030	0.0000	0.0050	0.0198
FRAC	0.0188	0.0099	0.0001	0.0052	0.0491
FREU	0.9008	0.0808	0.0065	0.7239	1.0793
TRES	0.0800	0.0115	0.0001	0.0601	0.0998
ZKD	1.1504	0.3460	0.1197	0.5832	2.2886
ASC	20.0172	5.9906	35.8872	10.0434	38.6564
CTE	18.0285	5.3796	28.9399	9.1805	34.9237
GAM	1.3901	0.0619	0.0038	1.2553	1.5256
KSA	39.2140	11.7694	138.5193	19.9595	75.7064
KSM	0.0880	0.0196	0.0004	0.0451	0.1307
TPO	46.7838	2.1023	4.4197	42.2032	51.3397
WIL	16.8018	0.7519	0.5653	15.1230	18.4658
XMP	38.7604	1.7373	3.0180	34.9835	42.5874
ZLA	0.0840	0.0252	0.0006	0.0425	0.1620
ZM	0.4995	0.1505	0.0226	0.2503	0.9892
ZN	4.9231	0.7007	0.4909	3.3750	6.4585
BETA	0.1995	0.0601	0.0036	0.1020	0.3965
CANC	2.0012	0.5990	0.3588	1.0122	3.8891
CFOR	1.7001	0.1336	0.0179	1.4059	1.9957
CRIT	4.9961	1.3320	1.7743	2.0485	7.9781
DFOR	0.6999	0.0446	0.0020	0.6028	0.7995
LAIH	1.0019	0.3021	0.0913	0.5064	1.9641
LAIX	6.2023	0.4454	0.1984	5.2041	7.1850
LAIN	0.9989	0.2232	0.0498	0.5063	1.4928
RINI	0.2005	0.0447	0.0020	0.1011	0.2970
RMAX	0.7996	0.0893	0.0080	0.6029	0.9959
RPIN	70.0353	4.4291	19.6170	60.1622	79.8313
WATE	10.4971	5.5004	30.2548	1.0702	19.9289
ZALP	1.1492	0.0869	0.0076	1.0012	1.2990
ZHMI	0.1501	0.0223	0.0005	0.1007	0.1997
ZFIN	0.1000	0.0301	0.0009	0.0505	0.1981

Appendix 37. Statistics for MACRO input parameters as generated by Monte Carlo sampling
(Pesticide T on Hodnet scenario)

Pesticide L on Wick	**Percolation (mm)**	**Pesticide losses (g ha^{-1})**
Number of successful model runs	250	250
Basic statistics		
Minimum value	914.19	0.00
Mean value	1084.10	58.55
Maximum value	1291.20	336.05
Range	377.01	336.05
Frequency		
Minimum value	914.19	1.97E-03
25th-percentile value	1035.98	14.78
Median value	1083.72	38.83
75th-percentile value	1124.15	90.92
Maximum value	1291.20	336.05
Dispersion		
Standard deviation	65.96	58.65
Variance	4350.84	3440.05
Standard error of the mean	4.17	3.71
Coefficient of variation	0.06	1.00
Distribution shape		
Skewness	0.25	1.68
Kurtosis	0.49	3.47

Appendix 38. Statistics for the MACRO output variables (Monte Carlo runs)
Pesticide L on Wick **scenario**

Pesticide T on Wick	**Percolation (mm)**	**Pesticide losses (g ha^{-1})**
Number of successful model runs	250	250
Basic statistics		
Minimum value	1384.14	0
Mean value	1643.32	24.06
Maximum value	1969.70	249.17
Range	585.56	249.17
Frequency		
Minimum value	1384.14	0
25th-percentile value	1582.22	1.89
Median value	1647.05	10.93
75th-percentile value	1706.12	30.35
Maximum value	1969.70	249.17
Dispersion		
Standard deviation	93.79	35.90
Variance	8797.44	1288.73
Standard error of the mean	5.93	2.27
Coefficient of variation	0.06	1.49
Distribution shape		
Skewness	0.08	3.06
Kurtosis	0.33	12.44

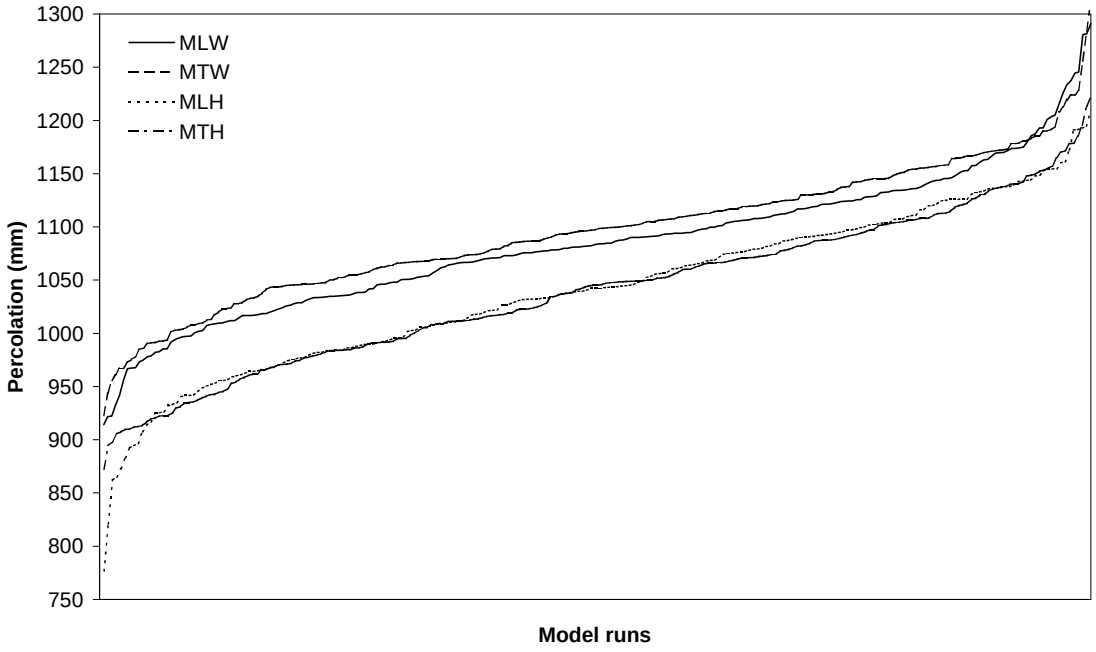
Appendix 39. Statistics for the MACRO output variables (Monte Carlo runs)
Pesticide T on Wick **scenario**

Pesticide L on Hodnet	**Percolation (mm)**	**Pesticide losses (g ha^{-1})**
Number of successful model runs	232	232
Basic statistics		
Minimum value	776.43	1.54
Mean value	1040.52	44.60
Maximum value	1209.20	129.58
Range	432.77	128.03
Frequency		
Minimum value	776.43	1.54
25th-percentile value	986.35	22.81
Median value	1042.36	37.55
75th-percentile value	1096.24	62.84
Maximum value	1209.20	129.58
Dispersion		
Standard deviation	75.13	27.04
Variance	5644.88	731.23
Standard error of the mean	4.93	1.78
Coefficient of variation	0.07	0.61
Distribution shape		
Skewness	-0.34	0.72
Kurtosis	0.05	-0.12

Appendix 40. Statistics for the MACRO output variables (Monte Carlo runs)
***Pesticide L on Hodnet* scenario**

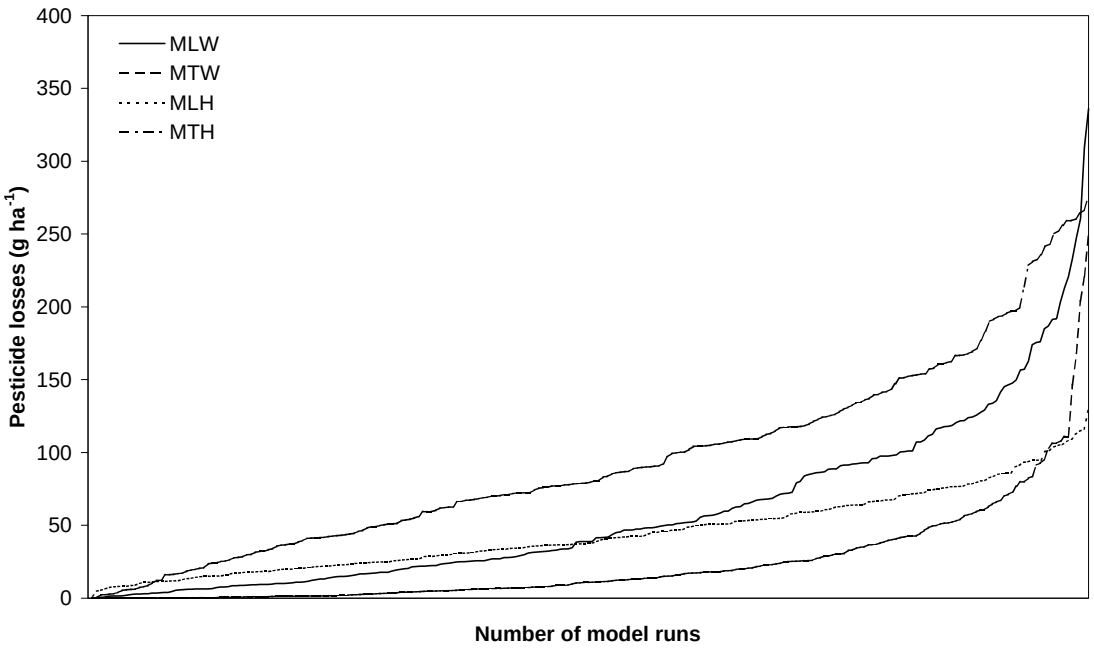
Pesticide T on Hodnet	**Percolation (mm)**	**Pesticide losses (g ha^{-1})**
Number of successful model runs	233	233
Basic statistics		
Minimum value	872.23	0.12
Mean value	1039.27	93.82
Maximum value	1222.17	275.85
Range	349.94	275.73
Frequency		
Minimum value	872.23	0.12
25th-percentile value	984.74	43.09
Median value	1045.23	79.45
75th-percentile value	1090.17	127.96
Maximum value	1222.17	275.85
Dispersion		
Standard deviation	71.77	64.67
Variance	5150.22	4181.96
Standard error of the mean	4.70	4.24
Coefficient of variation	0.07	0.69
Distribution shape		
Skewness	0.01	0.84
Kurtosis	-0.59	0.23

Appendix 41. Statistics for the MACRO output variables (Monte Carlo runs)
Pesticide T on Hodnet **scenario**

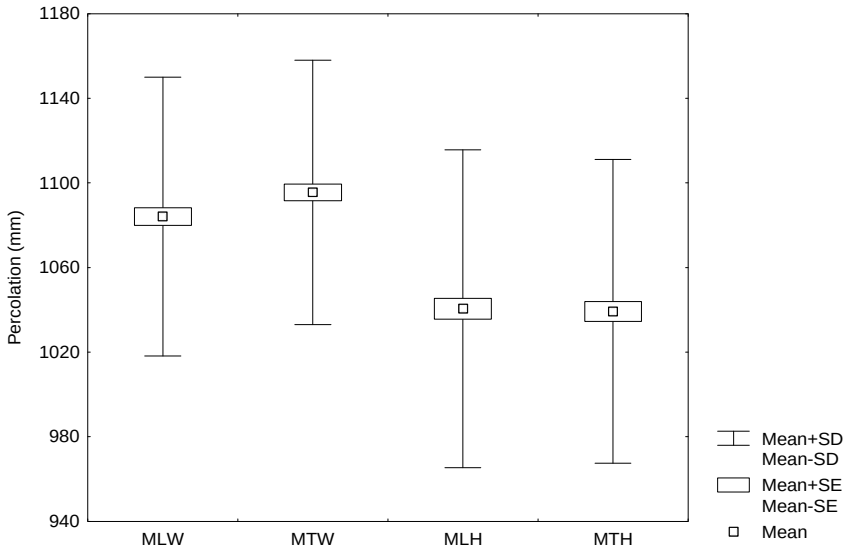


Appendix 42. Distribution of the percolation values obtained by running the different Monte Carlo-generated input files for the four scenarios.

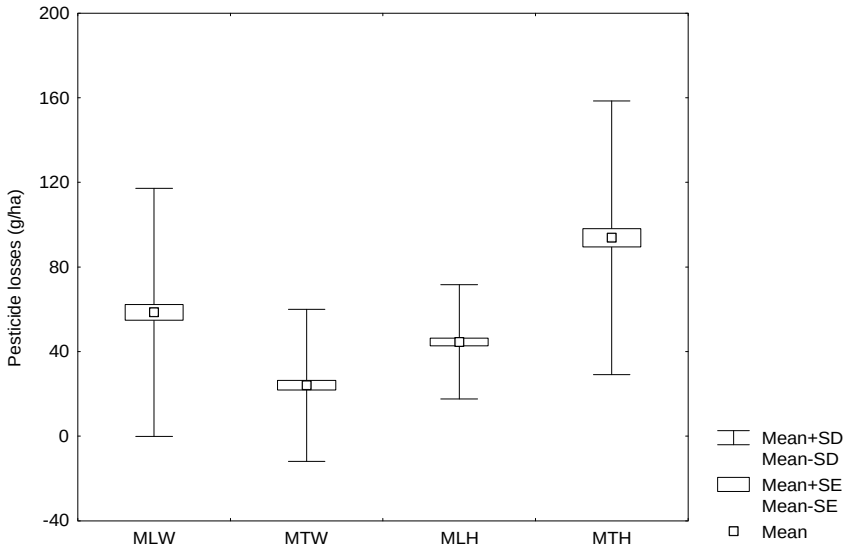
The values for MTW (runs over six years) have been scaled to represent equivalent values for four years.



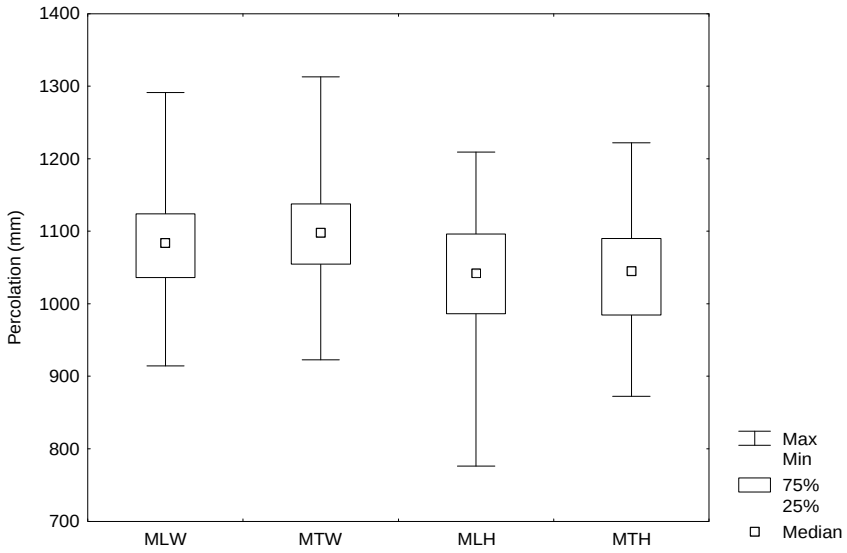
Appendix 43. Distribution of the values for pesticide losses obtained by running the different Monte Carlo-generated input files for the four scenarios.



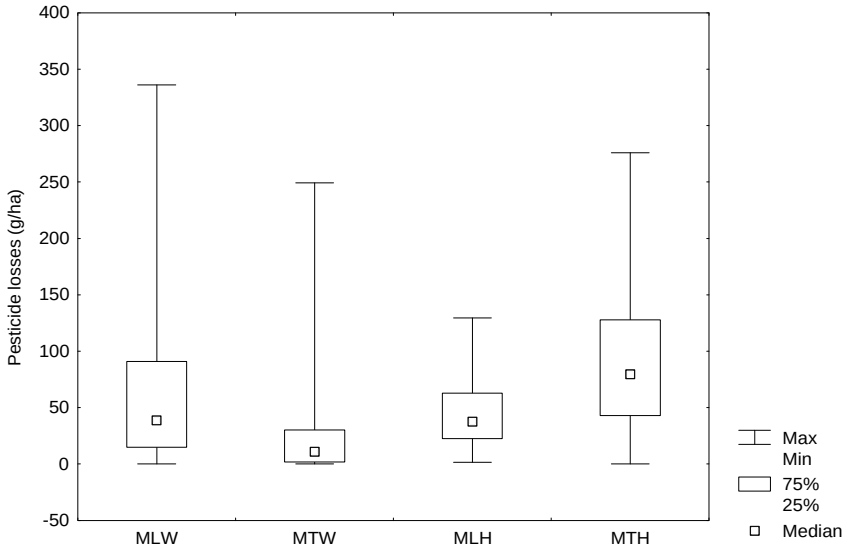
Appendix 44. Box plots presenting the mean, standard deviation and standard error of the mean for percolation values generated for the four scenarios
Values from MTW (6-year simulation) have been scaled to an equivalent of a four-year simulation



Appendix 45. Box plots presenting the mean, standard deviation and standard error of the mean for values of pesticide losses generated for the four scenarios



Appendix 46. Box plots presenting the median, the lower and upper quartiles and minimum and maximum values for percolation generated for the four scenarios
Values from MTW (6-year simulation) have been scaled to an equivalent of a four-year simulation



Appendix 47. Box plots presenting the median, the lower and upper quartiles and minimum and maximum values for pesticide losses generated for the four scenarios

Percolation		
Ranking	Parameter	Betas
1	XMPOR	-0.579
2	ROOTMAX	-0.415
3	CTEN	-0.373
4	ZLAMB	0.309
5	THETAINI	0.307
6	RPIN	0.242
7	ZALP	-0.167
8	KSM	0.132
9	WILT	0.118
10	BETA	0.091
11	CANCAP	-0.050
12	ANNAMP	-0.043
13	FEXT	-0.038
14	ZKD	0.037
15	FREUND	0.037
16	ZFINT	-0.037
17	CANDEG	0.036
18	DV	-0.035
19	ROOTINIT	-0.033
20	LAIHAR	-0.032
21	ZM	0.028
22	CFORM	0.028
23	FRACMAC	-0.025
24	EXPB	-0.018
25	GAMMA	0.017
26	WATEN	0.016
27	LAIMIN	0.016
28	LAIMAX	-0.016
29	ASCALE	-0.014
30	DFORM	-0.013
31	KSATMIN	0.012
32	ZHMIN	0.012
33	ZN	0.009
34	TPORV	0.008
35	ZMIX	0.004
36	TRESP	0.004
37	ANNTAV	0.003
38	DEG	0.002
39	FSTAR	-0.002
40	CRITAIR	0.002
41	TEMPINI	0.001
42	DIFF	0.000
43	RINTEN	0.000

Pesticide losses		
Ranking	Parameter	Betas
1	DEG	-0.648
2	ZKD	-0.483
3	FREUND	0.292
4	TRESP	0.287
5	ANNTAV	-0.144
6	ZLAMB	0.104
7	FSTAR	-0.060
8	EXPB	0.055
9	WILT	-0.052
10	XMPOR	-0.048
11	ZFINT	-0.047
12	GAMMA	-0.036
13	ZM	-0.035
14	ZMIX	-0.034
15	KSM	0.030
16	THETAINI	-0.027
17	CANCAP	0.026
18	RINTEN	-0.024
19	ZHMIN	-0.023
20	ANNAMP	0.022
21	ZN	-0.022
22	KSATMIN	-0.019
23	WATEN	-0.016
24	CFORM	-0.016
25	LAIHAR	-0.016
26	BETA	-0.015
27	FRACMAC	0.014
28	ASCALE	-0.013
29	ZALP	-0.013
30	DV	-0.013
31	TEMPINI	-0.011
32	RPIN	0.011
33	DFORM	0.010
34	TPORV	-0.008
35	ROOTINIT	0.006
36	LAIMAX	0.006
37	CANDEG	0.005
38	LAIMIN	0.004
39	CTEN	-0.004
40	ROOTMAX	-0.003
41	DIFF	0.003
42	CRITAIR	0.002
43	FEXT	0.001

Appendix 48. Classification of MACRO parameters according to their influence on percolation and pesticide losses, using the betas derived from a multiple linear regression on ranked data (Monte Carlo approach).
***Pesticide L on Wick* scenario**

Percolation		
Ranking	Parameter	Betas
1	XMPOR	-0.494
2	ROOTMAX	-0.442
3	CTEN	-0.372
4	ZLAMB	0.330
5	THETAINI	0.228
6	RPIN	0.224
7	BETA	0.149
8	ZALP	-0.140
9	WILT	0.117
10	KSM	0.086
11	FREUND	0.062
12	RINTEN	0.055
13	CANCAP	-0.047
14	ZM	0.043
15	ASCALE	0.040
16	TPORV	-0.039
17	CFORM	0.033
18	FSTAR	-0.029
19	DIFF	-0.026
20	WATEN	-0.025
21	DV	-0.024
22	DFORM	0.024
23	ZHMIN	-0.023
24	ROOTINIT	-0.021
25	EXPB	0.021
26	ANNAMP	0.020
27	ZKD	-0.020
28	LAIMAX	0.020
29	CRITAIR	-0.019
30	ZFINT	0.018
31	ZMIX	0.017
32	CANDEG	-0.017
33	FEXT	0.016
34	ANNTAV	-0.015
35	LAIMIN	-0.013
36	KSATMIN	0.011
37	TEMPINI	-0.010
38	LAIHAR	-0.009
39	TRESP	0.006
40	ZN	-0.005
41	GAMMA	-0.005
42	DEG	0.001
43	FRACMAC	0.001

Pesticide losses		
Ranking	Parameter	Betas
1	FREUND	0.523
2	ZKD	-0.484
3	DEG	-0.479
4	KSM	-0.210
5	ZN	-0.210
6	TRESP	0.182
7	ANNTAV	-0.110
8	ZLAMB	-0.097
9	ASCALE	0.082
10	EXPB	0.082
11	KSATMIN	0.075
12	RINTEN	0.071
13	GAMMA	-0.068
14	FRACMAC	-0.066
15	ROOTINIT	0.063
16	TPORV	-0.057
17	CTEN	-0.051
18	ZALP	0.050
19	LAIHAR	-0.040
20	LAIMAX	-0.039
21	CANDEG	0.036
22	FSTAR	0.033
23	FEXT	0.031
24	RPIN	-0.031
25	THETAINI	-0.030
26	TEMPINI	-0.026
27	ZFINT	-0.026
28	XMPOR	0.020
29	CFORM	-0.018
30	DV	0.017
31	ZHMIN	-0.012
32	ROOTMAX	0.007
33	DFORM	0.007
34	DIFF	-0.007
35	WILT	-0.006
36	ZMIX	-0.006
37	WATEN	0.005
38	ANNAMP	-0.005
39	ZM	-0.003
40	CRITAIR	-0.003
41	BETA	-0.002
42	CANCAP	0.001
43	LAIMIN	0.001

Appendix 49. Classification of MACRO parameters according to their influence on percolation and pesticide losses, using the betas derived from a multiple linear regression on ranked data (Monte Carlo approach).
***Pesticide T on Wick* scenario**

Percolation		
Ranking	Parameter	Betas
1	THETAINI	0.481
2	XMPOR	-0.473
3	ROOTMAX	-0.409
4	RPIN	0.265
5	CTEN	-0.240
6	WILT	0.159
7	BETA	0.152
8	ZALP	-0.136
9	TPORV	-0.130
10	ZN	-0.084
11	CANCAP	-0.079
12	ZLAMB	-0.075
13	ZM	0.060
14	LAIMAX	-0.054
15	ZFINT	-0.045
16	CRITAIR	0.043
17	DV	0.038
18	DFORM	-0.037
19	LAIMIN	-0.037
20	RINTEN	0.032
21	FSTAR	-0.031
22	FEXT	-0.030
23	CANDEG	-0.028
24	CFORM	0.025
25	TEMPINI	0.024
26	ANNAMP	0.020
27	FRACMAC	0.016
28	KSM	0.016
29	KSATMIN	0.015
30	DIFF	0.013
31	DEG	0.012
32	WATEN	-0.012
33	FREUND	-0.012
34	ANNTAV	-0.011
35	GAMMA	-0.011
36	TRESP	-0.010
37	EXPB	-0.009
38	ZHMIN	0.005
39	ASCALE	-0.005
40	ROOTINIT	-0.004
41	ZKD	-0.003
42	ZMIX	-0.003
43	LAIHAR	0.002

Pesticide losses		
Ranking	Parameter	Betas
1	DEG	-0.730
2	TRESP	0.331
3	KSM	-0.268
4	ZN	-0.208
5	ASCALE	0.179
6	FREUND	0.170
7	TPORV	-0.167
8	ZLAMB	-0.162
9	ANNTAV	-0.114
10	DIFF	-0.100
11	ZKD	-0.092
12	KSATMIN	0.059
13	XMPOR	0.051
14	ANNAMP	0.050
15	CTEN	-0.050
16	LAIMIN	-0.042
17	CANDEG	-0.034
18	DFORM	0.030
19	RPIN	0.025
20	WATEN	-0.023
21	WILT	-0.023
22	ROOTMAX	-0.021
23	CANCAP	0.021
24	ZMIX	-0.020
25	DV	-0.020
26	FRACMAC	-0.018
27	FEXT	0.014
28	ZM	-0.014
29	ZFINT	0.014
30	FSTAR	0.013
31	CRITAIR	-0.011
32	ZALP	-0.010
33	CFORM	0.009
34	ROOTINIT	0.008
35	RINTEN	-0.006
36	GAMMA	-0.006
37	BETA	0.006
38	EXPB	0.005
39	LAIMAX	-0.004
40	TEMPINI	-0.002
41	THETAINI	-0.001
42	ZHMIN	0.000
43	LAIHAR	0.000

Appendix 50. Classification of MACRO parameters according to their influence on percolation and pesticide losses, using the betas derived from a multiple linear regression on ranked data (Monte Carlo approach).
***Pesticide L on Hodnet* scenario**

Percolation		
Ranking	Parameter	Betas
1	THETAINI	0.506
2	XMPOR	-0.500
3	ROOTMAX	-0.413
4	RPIN	0.260
5	CTEN	-0.253
6	WILT	0.204
7	BETA	0.173
8	TPORV	-0.146
9	ZALP	-0.135
10	ZN	-0.089
11	WATEN	-0.074
12	ZLAMB	-0.063
13	LAIMIN	-0.050
14	DIFF	-0.044
15	ZM	0.040
16	ZMIX	-0.032
17	CANCAP	-0.028
18	KSATMIN	0.028
19	CANDEG	-0.024
20	RINTEN	0.023
21	ASCALE	0.022
22	DEG	0.021
23	CRITAIR	0.018
24	FRACMAC	0.016
25	FREUND	0.016
26	EXPB	0.015
27	ANNAMP	-0.015
28	ROOTINIT	0.015
29	LAIMAX	-0.014
30	DFORM	-0.011
31	TEMPINI	0.010
32	TRESP	-0.010
33	FEXT	0.010
34	ZHMIN	-0.010
35	ZKD	-0.009
36	FSTAR	0.009
37	CFORM	-0.009
38	GAMMA	0.006
39	LAIHAR	-0.004
40	ANNTAV	0.003
41	KSM	-0.002
42	DV	0.002
43	ZFINT	-0.001

Pesticide losses		
Ranking	Parameter	Betas
1	ASCALE	0.463
2	KSM	-0.345
3	ZN	-0.294
4	DEG	-0.286
5	FREUND	0.261
6	DIFF	-0.235
7	ZKD	-0.214
8	TPORV	-0.205
9	ZLAMB	-0.131
10	TRESP	0.110
11	FRACMAC	-0.099
12	RINTEN	0.089
13	CTEN	-0.082
14	KSATMIN	0.081
15	XMPOR	0.081
16	ZMIX	0.060
17	ZFINT	-0.053
18	CANCAP	0.048
19	DV	-0.046
20	LAIMAX	-0.038
21	GAMMA	-0.035
22	ANNTAV	-0.032
23	LAIMIN	-0.030
24	EXPB	0.028
25	ROOTMAX	0.025
26	ZHMIN	-0.024
27	ROOTINIT	0.021
28	ZM	-0.020
29	LAIHAR	-0.017
30	CFORM	0.017
31	DFORM	0.016
32	CRITAIR	0.013
33	FEXT	0.012
34	ANNAMP	0.011
35	TEMPINI	0.011
36	ZALP	0.010
37	THETAINI	0.009
38	CANDEG	-0.004
39	WATEN	-0.004
40	BETA	-0.003
41	FSTAR	0.003
42	RPIN	0.003
43	WILT	0.001

Appendix 51. Classification of MACRO parameters according to their influence on percolation and pesticide losses, using the betas derived from a multiple linear regression on ranked data (Monte Carlo approach).
***Pesticide T on Hodnet* scenario**

	MLW		MTW		MLH		MTH	
	Beta	Rank	Beta	Rank	Beta	Rank	Beta	Rank
ANNAMP	0.0224	20	0.0276	17	-0.0051	35	0.0085	31
ANNTAV	-0.0087	35	0.0135	25	0.0015	40	-0.0017	43
RINTEN	0.0139	29	0.0354	13	0.0241	15	0.0286	14
TEMPINI	-0.0316	14	0.0123	27	0.0109	26	-0.0145	19
THETAINI	0.3213	5	0.2551	5	0.4852	2	0.5041	2
DIFF	-0.0189	24	-0.0098	31	-0.0010	41	-0.0114	27
DV	-0.0135	30	-0.0115	28	0.0139	23	-0.0025	41
FSTAR	0.0088	34	-0.0129	26	-0.0140	20	0.0082	32
ZMIX	-0.0190	23	-0.0002	42	0.0062	33	-0.0087	30
CANDEG	0.0352	13	0.0099	30	0.0066	32	0.0025	42
DEG	-0.0105	33	-0.0147	24	0.0163	19	0.0135	22
EXPB	-0.0212	21	0.0031	39	0.0026	38	0.0117	25
FEXT	-0.0292	16	0.0001	43	0.0005	43	-0.0080	33
FRACMAC	-0.0209	22	-0.0048	36	0.0087	29	-0.0050	37
FREUND	0.0085	37	0.0258	19	0.0078	30	0.0036	38
TRESP	0.0164	25	0.0175	21	0.0092	28	-0.0116	26
ZKD	0.0263	17	-0.0086	32	-0.0068	31	-0.0029	40
ASCALE	-0.0084	38	-0.0107	29	0.0036	37	-0.0105	28
CTEN	-0.3515	4	-0.3738	4	-0.2596	5	-0.2698	5
GAMMA	0.0129	31	0.0053	35	0.0051	36	0.0055	34
KSATMIN	0.0022	41	0.0047	37	0.0139	22	0.0204	17
KSM	0.1198	8	0.0894	10	0.0052	34	0.0050	36
TPORV	-0.0086	36	-0.0326	14	-0.1334	9	-0.1511	8
WILT	0.1117	9	0.1187	9	0.1936	6	0.1986	6
XMPOR	-0.5357	1	-0.5181	1	-0.4911	1	-0.5099	1
ZLAMB	0.3958	2	0.3965	3	-0.0918	10	-0.0949	10
ZM	0.0230	19	0.0278	16	0.0224	17	0.0275	16
ZN	-0.0149	27	-0.0212	20	-0.0835	11	-0.0912	11
BETA	0.1047	10	0.1359	8	0.1690	7	0.1716	7
CANCAP	-0.0545	11	-0.0593	11	-0.0618	12	-0.0702	12
CFORM	-0.0007	42	0.0028	40	0.0111	25	0.0136	21
CRITAIR	0.0144	28	0.0062	34	0.0009	42	0.0033	39
DFORM	-0.0072	40	0.0002	41	-0.0224	16	0.0138	20
LAIHAR	0.0003	43	-0.0157	23	0.0102	27	0.0121	24
LAIMAX	-0.0114	32	0.0275	18	-0.0173	18	-0.0132	23
LAIMIN	-0.0082	39	-0.0162	22	-0.0341	13	-0.0277	15
ROOTINIT	-0.0498	12	-0.0299	15	-0.0021	39	-0.0092	29
ROOTMAX	-0.3763	3	-0.4262	2	-0.4146	3	-0.4229	3
RPIN	0.2630	6	0.2445	6	0.2729	4	0.2756	4
WATEN	-0.0312	15	-0.0355	12	-0.0257	14	-0.0463	13
ZALP	-0.1738	7	-0.1615	7	-0.1410	8	-0.1318	9
ZHMIN	-0.0155	26	-0.0070	33	-0.0140	21	0.0155	18
ZFIN	0.0233	18	0.0034	38	0.0130	24	-0.0054	35

Appendix 52. Sensitivity of percolation in MACRO as calculated from the untransformed data for the four scenarios (Monte Carlo approach).

Betas are the coefficients of a normalised regression

The ranking has been performed on absolute betas

	MLW		MTW		MLH		MTH	
	Beta	Rank	Beta	Rank	Beta	Rank	Beta	Rank
ANNAMP	0.0693	8	-0.0038	43	-0.0089	36	0.0066	41
ANNTAV	-0.0921	7	-0.1260	6	-0.1302	9	-0.0220	29
RINTEN	-0.0636	10	0.0706	13	0.0108	34	0.1007	12
TEMPINI	-0.0326	22	-0.1204	7	-0.0072	39	-0.0314	21
THETAINI	-0.0257	25	-0.0130	35	-0.0181	30	-0.0267	26
DIFF	0.0230	29	-0.0253	30	-0.0792	11	-0.2325	6
DV	-0.0071	39	0.0928	9	0.0008	43	-0.0015	43
FSTAR	-0.0028	42	-0.0244	31	-0.0187	29	0.0142	35
ZMIX	-0.0159	31	-0.0101	41	-0.0081	37	0.0381	17
CANDEG	-0.0375	19	-0.0139	34	-0.0068	40	-0.0093	39
DEG	-0.5529	1	-0.3531	3	-0.6779	1	-0.2600	4
EXPB	0.1039	6	0.0481	23	-0.0332	19	0.0249	27
FEXT	0.0658	9	0.0566	17	0.0406	15	0.0239	28
FRACMAC	0.0089	38	-0.0090	42	0.0217	27	-0.0617	15
FREUND	0.2843	3	0.4802	1	0.1531	8	0.2490	5
TRESP	0.2715	4	0.1847	4	0.3262	2	0.1305	9
ZKD	-0.4293	2	-0.4068	2	-0.0858	10	-0.1848	8
ASCALE	-0.0321	23	0.0320	27	0.1701	7	0.4622	1
CTEN	-0.0232	28	-0.0124	36	-0.0577	13	-0.0522	16
GAMMA	0.0114	36	-0.0507	22	0.0100	35	-0.0370	18
KSATMIN	-0.0516	14	0.0320	26	0.0746	12	0.1181	10
KSM	0.0489	16	-0.1631	5	-0.2942	3	-0.3668	2
TPORV	-0.0157	32	-0.0681	14	-0.1729	5	-0.2153	7
WILT	-0.0240	27	0.0543	19	-0.0369	16	-0.0071	40
XMPOR	-0.0495	15	-0.0121	37	0.0356	17	0.0777	13
ZLAMB	0.1122	5	-0.0120	38	-0.1703	6	-0.1038	11
ZM	-0.0577	12	0.0763	11	-0.0043	42	0.0215	31
ZN	0.0012	43	-0.1009	8	-0.2075	4	-0.2760	3
BETA	0.0144	34	-0.0116	39	0.0073	38	0.0023	42
CANCAP	0.0045	41	-0.0476	24	0.0245	23	0.0153	34
CFORM	0.0254	26	-0.0104	40	-0.0342	18	-0.0139	36
CRITAIR	-0.0348	20	-0.0264	29	0.0222	26	-0.0325	20
DFORM	-0.0049	40	-0.0143	33	0.0313	20	-0.0299	22
LAIHAR	-0.0273	24	-0.0147	32	-0.0208	28	0.0126	37
LAIMAX	0.0343	21	0.0282	28	0.0222	24	-0.0216	30
LAIMIN	0.0140	35	0.0884	10	-0.0153	31	-0.0285	23
ROOTINIT	-0.0463	17	0.0531	20	0.0050	41	0.0179	32
ROOTMAX	0.0111	37	-0.0545	18	-0.0287	22	-0.0272	25
RPIN	-0.0218	30	-0.0655	15	0.0153	32	-0.0113	38
WATEN	0.0154	33	0.0635	16	0.0548	14	-0.0284	24
ZALP	-0.0555	13	-0.0334	25	-0.0222	25	0.0168	33
ZHMIN	0.0594	11	-0.0513	21	0.0137	33	-0.0347	19
ZFIN	-0.0395	18	-0.0737	12	-0.0300	21	-0.0775	14

Appendix 53. Sensitivity of pesticide losses in MACRO as calculated from the untransformed data for the four scenarios (Monte Carlo approach).

Betas are the coefficients of a normalised regression

The ranking has been performed on absolute betas

	MLW		MTW		MLH		MTH	
	Beta	Rank	Beta	Rank	Beta	Rank	Beta	Rank
ANNAMP	-0.0426	12	0.0203	26	0.0200	26	-0.01462	27
ANNTAV	0.0027	37	-0.0150	34	-0.0114	34	0.002892	40
RINTEN	-0.0003	43	0.0547	12	0.0325	20	0.023499	20
TEMPINI	0.0006	41	-0.0100	37	0.0239	25	0.010437	31
THETAINI	0.3068	5	0.2281	5	0.4806	1	0.50569	1
DIFF	0.0003	42	-0.0264	19	0.0131	30	-0.04367	14
DV	-0.0348	18	-0.0244	21	0.0377	17	0.001749	42
FSTAR	-0.0018	39	-0.0294	18	-0.0306	21	0.008842	36
ZMIX	0.0044	35	0.0173	31	-0.0026	42	-0.03196	16
CANDEG	0.0360	17	-0.0165	32	-0.0284	23	-0.02371	19
DEG	0.0023	38	0.0014	42	0.0124	31	0.020919	22
EXPB	-0.0183	24	0.0209	25	-0.0089	37	0.014844	26
FEXT	-0.0377	13	0.0163	33	-0.0305	22	0.009926	33
FRACMAC	-0.0246	23	0.0006	43	0.0158	27	0.016359	24
FREUND	0.0370	15	0.0619	11	-0.0119	33	0.015566	25
TRESP	0.0036	36	0.0057	39	-0.0096	36	-0.00997	32
ZKD	0.0373	14	-0.0200	27	-0.0035	41	-0.00939	35
ASCALE	-0.0136	29	0.0397	15	-0.0045	39	0.022399	21
CTEN	-0.3726	3	-0.3717	3	-0.2403	5	-0.25262	5
GAMMA	0.0165	25	-0.0051	41	-0.0106	35	0.005913	38
KSATMIN	0.0122	31	0.0109	36	0.0149	29	0.027582	18
KSM	0.1318	8	0.0856	10	0.0157	28	-0.00184	41
TPORV	0.0076	34	-0.0395	16	-0.1303	9	-0.14639	8
WILT	0.1176	9	0.1174	9	0.1589	6	0.20425	6
XMPOR	-0.5786	1	-0.4942	1	-0.4730	2	-0.50024	2
ZLAMB	0.3091	4	0.3305	4	-0.0749	12	-0.0633	12
ZM	0.0281	21	0.0434	14	0.0602	13	0.039745	15
ZN	0.0086	33	-0.0052	40	-0.0839	10	-0.08901	10
BETA	0.0912	10	0.1487	7	0.1521	7	0.173139	7
CANCAP	-0.0504	11	-0.0472	13	-0.0794	11	-0.0277	17
CFORM	0.0277	22	0.0327	17	0.0254	24	-0.00868	37
CRITAIR	0.0017	40	-0.0186	29	0.0426	16	0.01816	23
DFORM	-0.0128	30	0.0238	22	-0.0368	18	-0.01065	30
LAIHAR	-0.0319	20	-0.0086	38	0.0019	43	-0.00414	39
LAIMAX	-0.0158	28	0.0198	28	-0.0541	14	-0.01444	29
LAIMIN	0.0162	27	-0.0127	35	-0.0367	19	-0.05039	13
ROOTINIT	-0.0328	19	-0.0210	24	-0.0037	40	0.014613	28
ROOTMAX	-0.4149	2	-0.4416	2	-0.4088	3	-0.41314	3
RPIN	0.2416	6	0.2244	6	0.2649	4	0.259548	4
WATEN	0.0165	26	-0.0248	20	-0.0124	32	-0.07434	11
ZALP	-0.1668	7	-0.1400	8	-0.1363	8	-0.13511	9
ZHMIN	0.0117	32	-0.0227	23	0.0049	38	-0.0098	34
ZFIN	-0.0370	16	0.0182	30	-0.0452	15	-0.00148	43

Appendix 54. Sensitivity of percolation in MACRO
as calculated from the transformed data for the four scenarios (Monte Carlo approach).
The transformation consisted in replacing parameter values by their rank
Betas are the coefficients of a normalised regression
The ranking has been performed on absolute betas

	MLW		MTW		MLH		MTH	
	Beta	Rank	Beta	Rank	Beta	Rank	Beta	Rank
ANNAMP	0.0218	20	-0.0051	38	0.0500	14	0.0115	34
ANNTAV	-0.1445	5	-0.1101	7	-0.1142	9	-0.0325	22
RINTEN	-0.0238	18	0.0710	12	-0.0063	35	0.0892	12
TEMPINI	-0.0114	31	-0.0259	26	-0.0019	40	0.0107	35
THETAINI	-0.0271	16	-0.0303	25	-0.0011	41	0.0088	37
DIFF	0.0030	41	-0.0065	34	-0.1005	10	-0.2354	6
DV	-0.0129	30	0.0167	30	-0.0199	25	-0.0459	19
FSTAR	-0.0605	7	0.0334	22	0.0131	30	0.0025	41
ZMIX	-0.0342	14	-0.0064	36	-0.0204	24	0.0604	16
CANDEG	0.0046	37	0.0360	21	-0.0336	17	-0.0042	38
DEG	-0.6483	1	-0.4788	3	-0.7296	1	-0.2861	4
EXPB	0.0554	8	0.0817	10	0.0050	38	0.0281	24
FEXT	0.0011	43	0.0308	23	0.0144	27	0.0119	33
FRACMAC	0.0136	27	-0.0661	14	-0.0183	26	-0.0986	11
FREUND	0.2917	3	0.5226	1	0.1699	6	0.2612	5
TRESP	0.2870	4	0.1821	6	0.3306	2	0.1100	10
ZKD	-0.4827	2	-0.4843	2	-0.0918	11	-0.2143	7
ASCALE	-0.0133	28	0.0823	9	0.1787	5	0.4629	1
CTEN	-0.0035	39	-0.0514	17	-0.0497	15	-0.0819	13
GAMMA	-0.0359	12	-0.0681	13	-0.0063	36	-0.0345	21
KSATMIN	-0.0195	22	0.0746	11	0.0587	12	0.0813	14
KSM	0.0301	15	-0.2104	4	-0.2684	3	-0.3454	2
TPORV	-0.0077	34	-0.0570	16	-0.1674	7	-0.2049	8
WILT	-0.0524	9	-0.0064	35	-0.0230	21	0.0010	43
XMPOR	-0.0483	10	0.0198	28	0.0511	13	0.0806	15
ZLAMB	0.1038	6	-0.0972	8	-0.1618	8	-0.1312	9
ZM	-0.0354	13	-0.0035	39	-0.0138	28	-0.0198	28
ZN	-0.0216	21	-0.2097	5	-0.2082	4	-0.2937	3
BETA	-0.0154	26	-0.0021	41	0.0060	37	-0.0034	40
CANCAP	0.0263	17	0.0012	42	0.0205	23	0.0476	18
CFORM	-0.0157	24	-0.0182	29	0.0094	33	0.0172	30
CRITAIR	0.0017	42	-0.0029	40	-0.0108	31	0.0128	32
DFORM	0.0102	33	0.0065	33	0.0299	18	0.0163	31
LAIHAR	-0.0156	25	-0.0404	19	0.0004	43	-0.0174	29
LAIMAX	0.0058	36	-0.0395	20	-0.0040	39	-0.0383	20
LAIMIN	0.0042	38	0.0008	43	-0.0424	16	-0.0301	23
ROOTINIT	0.0064	35	0.0633	15	0.0077	34	0.0212	27
ROOTMAX	-0.0033	40	0.0070	32	-0.0210	22	0.0251	25
RPIN	0.0110	32	-0.0306	24	0.0248	19	0.0025	42
WATEN	-0.0158	23	0.0051	37	-0.0230	20	-0.0036	39
ZALP	-0.0132	29	0.0499	18	-0.0097	32	0.0103	36
ZHMIN	-0.0233	19	-0.0117	31	-0.0005	42	-0.0241	26
ZFIN	-0.0471	11	-0.0256	27	0.0136	29	-0.0533	17

Appendix 55. Sensitivity of pesticide losses in MACRO
as calculated from the transformed data for the four scenarios (Monte Carlo approach).
The transformation consisted in replacing parameter values by their rank
Betas are the coefficients of a normalised regression
The ranking has been performed on absolute betas

	MLW		MTW		MLH		MTH	
	Betas	Rank	Betas	Rank	Betas	Rank	Betas	Rank
XMPOR	-0.579	1	-0.494	1	-0.473	2	-0.500	2
ROOTMAX	-0.415	2	-0.442	2	-0.409	3	-0.413	3
THETAINI	0.307	5	0.228	5	0.481	1	0.506	1
CTEN	-0.373	3	-0.372	3	-0.240	5	-0.253	5
RPIN	0.242	6	0.224	6	0.265	4	0.260	4
WILT	0.118	9	0.117	9	0.159	6	0.204	6
BETA	0.091	10	0.149	7	0.152	7	0.173	7
ZLAMB	0.309	4	0.330	4	-0.075	12	-0.063	12
ZALP	-0.167	7	-0.140	8	-0.136	8	-0.135	9
CANCAP	-0.050	11	-0.047	13	-0.079	11	-0.028	17
ZM	0.028	21	0.043	14	0.060	13	0.040	15
TPORV	0.008	34	-0.039	16	-0.130	9	-0.146	8
FREUND	0.037	15	0.062	11	-0.012	33	0.016	25
KSM	0.132	8	0.086	10	0.016	28	-0.002	41
WATEN	0.016	26	-0.025	20	-0.012	32	-0.074	11
ANNAMP	-0.043	12	0.020	26	0.020	26	-0.015	27
CANDEG	0.036	17	-0.017	32	-0.028	23	-0.024	19
ZN	0.009	33	-0.005	40	-0.084	10	-0.089	10
LAIMIN	0.016	27	-0.013	35	-0.037	19	-0.050	13
RINTEN	0.000	43	0.055	12	0.032	20	0.023	20
DV	-0.035	18	-0.024	21	0.038	17	0.002	42
LAIMAX	-0.016	28	0.020	28	-0.054	14	-0.014	29
CFORM	0.028	22	0.033	17	0.025	24	-0.009	37
DFORM	-0.013	30	0.024	22	-0.037	18	-0.011	30
FEXT	-0.038	13	0.016	33	-0.030	22	0.010	33
ASCALE	-0.014	29	0.040	15	-0.005	39	0.022	21
ZFINT	-0.037	16	0.018	30	-0.045	15	-0.001	43
DIFF	0.000	42	-0.026	19	0.013	30	-0.044	14
CRITAIR	0.002	40	-0.019	29	0.043	16	0.018	23
ROOTINIT	-0.033	19	-0.021	24	-0.004	40	0.015	28
EXPB	-0.018	24	0.021	25	-0.009	37	0.015	26
FSTAR	-0.002	39	-0.029	18	-0.031	21	0.009	36
KSATMIN	0.012	31	0.011	36	0.015	29	0.028	18
FRACMAC	-0.025	23	0.001	43	0.016	27	0.016	24
ZKD	0.037	14	-0.020	27	-0.003	41	-0.009	35
ZMIX	0.004	35	0.017	31	-0.003	42	-0.032	16
ZHMIN	0.012	32	-0.023	23	0.005	38	-0.010	34
DEG	0.002	38	0.001	42	0.012	31	0.021	22
TEMPINI	0.001	41	-0.010	37	0.024	25	0.010	31
GAMMA	0.017	25	-0.005	41	-0.011	35	0.006	38
LAIHAR	-0.032	20	-0.009	38	0.002	43	-0.004	39
TRESP	0.004	36	0.006	39	-0.010	36	-0.010	32
ANNTAV	0.003	37	-0.015	34	-0.011	34	0.003	40

Appendix 56. Classification of MACRO parameters according to their influence on percolation as determined from the betas of a multiple linear regression on the ranked data from the Monte Carlo sampling runs

The ranking was performed on absolute values of betas
A positive (resp. negative) beta means that an increase in the value of the parameter will result in an increase (resp. decrease) in percolation

	MLW		MTW		MLH		MTH	
	Betas	Rank	Betas	Rank	Betas	Rank	Betas	Rank
DEG	-0.648	1	-0.479	3	-0.730	1	-0.286	4
FREUND	0.292	3	0.523	1	0.170	6	0.261	5
TRESP	0.287	4	0.182	6	0.331	2	0.110	10
ZKD	-0.483	2	-0.484	2	-0.092	11	-0.214	7
KSM	0.030	15	-0.210	4	-0.268	3	-0.345	2
ZLAMB	0.104	6	-0.097	8	-0.162	8	-0.131	9
ZN	-0.022	21	-0.210	5	-0.208	4	-0.294	3
ANNTAV	-0.144	5	-0.110	7	-0.114	9	-0.032	22
ASCALE	-0.013	28	0.082	9	0.179	5	0.463	1
KSATMIN	-0.019	22	0.075	11	0.059	12	0.081	14
TPORV	-0.008	34	-0.057	16	-0.167	7	-0.205	8
XMPOR	-0.048	10	0.020	28	0.051	13	0.081	15
RINTEN	-0.024	18	0.071	12	-0.006	35	0.089	12
FRACMAC	0.014	27	-0.066	14	-0.018	26	-0.099	11
EXPB	0.055	8	0.082	10	0.005	38	0.028	24
GAMMA	-0.036	12	-0.068	13	-0.006	36	-0.035	21
CTEN	-0.004	39	-0.051	17	-0.050	15	-0.082	13
ZFINT	-0.047	11	-0.026	27	0.014	29	-0.053	17
ZMIX	-0.034	14	-0.006	36	-0.020	24	0.060	16
DIFF	0.003	41	-0.007	34	-0.100	10	-0.235	6
FSTAR	-0.060	7	0.033	22	0.013	30	0.003	41
CANCAP	0.026	17	0.001	42	0.021	23	0.048	18
DV	-0.013	30	0.017	30	-0.020	25	-0.046	19
ANNAMP	0.022	20	-0.005	38	0.050	14	0.011	34
WILT	-0.052	9	-0.006	35	-0.023	21	0.001	43
ZM	-0.035	13	-0.003	39	-0.014	28	-0.020	28
ROOTINIT	0.006	35	0.063	15	0.008	34	0.021	27
CANDEG	0.005	37	0.036	21	-0.034	17	-0.004	38
DFORM	0.010	33	0.007	33	0.030	18	0.016	31
LAIMAX	0.006	36	-0.039	20	-0.004	39	-0.038	20
ZALP	-0.013	29	0.050	18	-0.010	32	0.010	36
CFORM	-0.016	24	-0.018	29	0.009	33	0.017	30
LAIHAR	-0.016	25	-0.040	19	0.000	43	-0.017	29
RPIN	0.011	32	-0.031	24	0.025	19	0.003	42
ZHMIN	-0.023	19	-0.012	31	0.000	42	-0.024	26
THETAINI	-0.027	16	-0.030	25	-0.001	41	0.009	37
ROOTMAX	-0.003	40	0.007	32	-0.021	22	0.025	25
WATEN	-0.016	23	0.005	37	-0.023	20	-0.004	39
LAIMIN	0.004	38	0.001	43	-0.042	16	-0.030	23
FEXT	0.001	43	0.031	23	0.014	27	0.012	33
TEMPINI	-0.011	31	-0.026	26	-0.002	40	0.011	35
BETA	-0.015	26	-0.002	41	0.006	37	-0.003	40
CRITAIR	0.002	42	-0.003	40	-0.011	31	0.013	32

Appendix 57. Classification of MACRO parameters according to their influence on pesticide losses as determined from the betas of a multiple linear regression on the ranked data from the Monte Carlo sampling runs

The ranking was performed on absolute values of betas
A positive (resp. negative) beta means that an increase in the value of the parameter will result in an increase (resp. decrease) in pesticide losses

	Percolation		Pesticide losses	
	Non-ranked	Ranked	Non-ranked	Ranked
MLW	0.957	0.909	0.760	0.954
MTW	0.960	0.907	0.683	0.922
MLH	0.986	0.950	0.891	0.954
MTH	0.982	0.965	0.899	0.925

Appendix 58. Comparison of the results from the multiple linear regressions (R^2 values) for raw and transformed data for the four scenarios (MACRO, Monte Carlo approach)

The transformation consisted in the replacement of values by their rank.

Sensitivity analysis of pesticide registration models

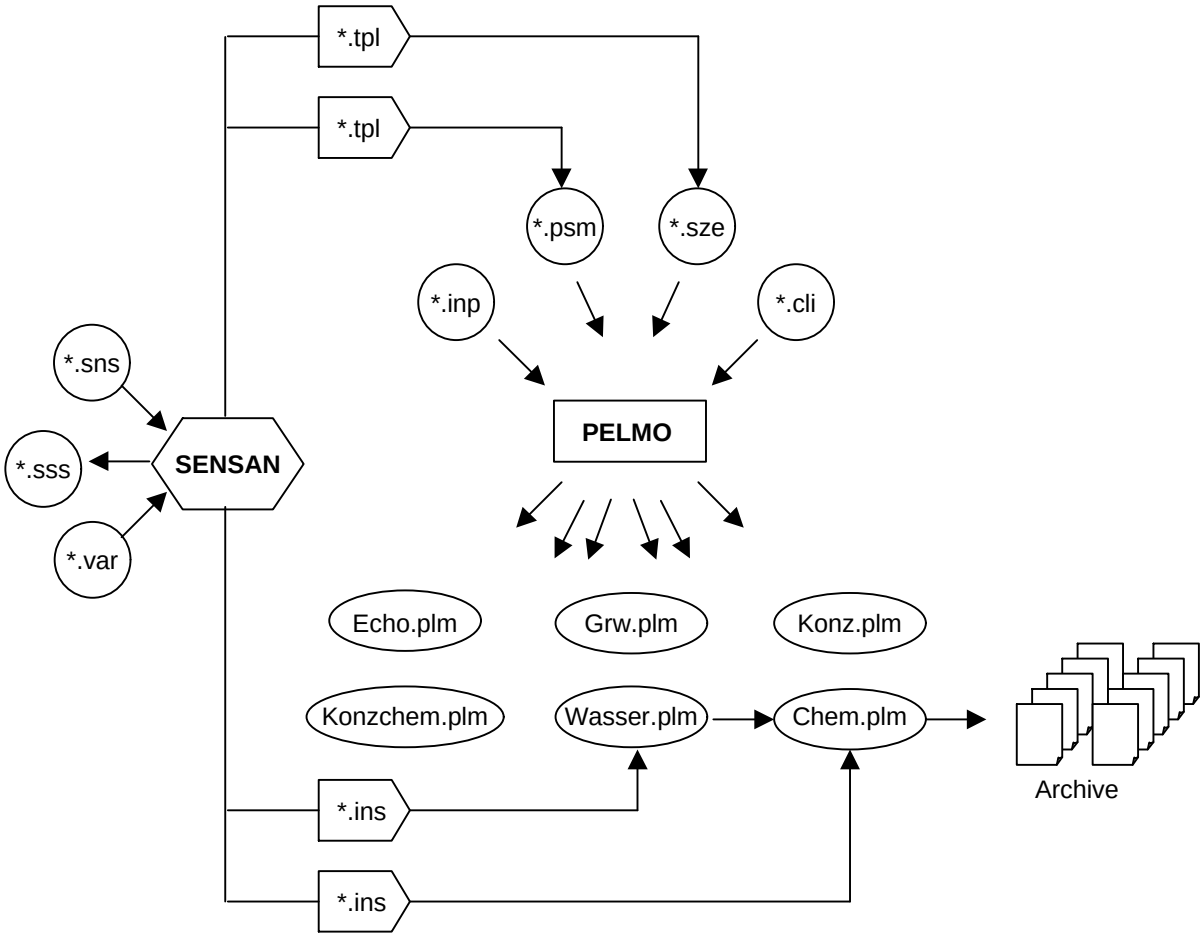
Appendices for PELMO

Appendix 59. Example of scenario file (*.sze) for PELMO (Pesticide L on Wick scenario)

```
Leacher on Wick
 1      0.45    4       15.0000 1       1
 0
 1
 8      .150000 60.0000 90.0000 3       86  75  80    1       1       1       0
    11
  121001  240602  070802     8
  121002  240603  070803     8
  121003  240604  070804     8
  121004  240605  070805     8
  121005  240606  070806     8
  121006  240607  070807     8
  121007  240608  070808     8
  121008  240609  070809     8
  121009  240610  070810     8
  121010  240611  070811     8
  121011  240612  070812     8
 100    .50000 50       0       0       0
 5
    1   10      1.35000 0       .277500 0
        .277500 .105400 1.70000 6.50000
    2   10      1.35000 0       .277500 0
        .277500 .105400 1.70000 6.50000
    3   30      1.45000 0       .191300 0
        .191300 .079400 .800000 7.00000
    4   25      1.41000 0       .146900 0
        .146900 .043700 .300000 7.00000
    5   25      1.53000 0       .192300 0
        .192300 .076500 .200000 6.90000
 0
    WATR    MNTH      1     PEST    MNTH      1     CONC    MNTH      1
       1
    COFX    MSER       0 1.E12
     0  0
   52.01
```

Appendix 60. Example of pesticide file (*.psm) for PELMO (Pesticide L on Wick scenario)

```
<COMMENT>
     <Pesticide L on Wick>
<END COMMENT>
<NUMBER OF SOIL HORIZONS>
 5
<END NUMBER OF SOIL HORIZONS>
<APPLICATION>
 1    <number of application>
01  11  01        2           0        <day month year app_rate app_depth>
 2    <pesticide appl. flag: 1=soil 2 =linear 3=exp. foliar>
 .0893000 .1000000                     <plant decay rate; extraction parameter>
<END APPLICATION>
<FLAGS>
 0   0   <henry(0=direct 1=calc.)  kd_flag(0=direct 1=calc.)>
<END FLAGS>
<VOLATILIZATION>
<henry       solub.      molmass     vap.press   diff air    depth volat.>
.0012180    0            200        0.00E+00    4.98E-02     0
<END VOLATILIZATION>
<DEGRADATION>
<degrate    degtemp     q10         moist-abs   moist-rel   moist-exp>
 0           20          2           0           40          0        <Met A1>
 0           20          2           0           40          0        <Met B1>
 0           20          2           0           40          0        <Met C1>
 0           20          2           0           40          0        <Met D1>
 .0893000    20        2.200000      27.75000    0           .7000000 <BR/CO2>
<END DEGRADATION>
<ADSORPTION>
<Koc-value    Fr.exp.Koc  pH          pKa     limit for Freundl.  ann.incr.>
 20          0.9         7           0           0.01             0
<END ADSORPTION>
<DEPTH DEPENDENT SORPTION AND TRANSFORMATION VALUES>
<Kd          Fr.exp.     Met A1   Met B1   Met C1   Met D1   BR/CO2 >
 .3400000  .900000       1        1        1        1        1      <horizon 1 >
 .3400000  .900000       1        1        1        1        1      <horizon 2 >
 .1600000  .900000       1        1        1        1        0.56   <horizon 3 >
 .0600000  .900000       1        1        1        1        0.30   <horizon 4 >
 .0400000  .900000       1        1        1        1        0.24   <horizon 5 >
<END DEPTH DEPENDENT>
<END PSM>
```



Appendix 61. Flow chart explaining the combination of PELMO and SENSAN

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

Appendix 62. List of PELMO parameters included in the sensitivity analyses

	Initial value	Absolute values		Perc. of variation		Multiplication factor	
		Min	Max	Min	Max	Min	Max
ANET	15	5	25	-66.67	66.67	0.33	1.67
CINT	0.15	0.1	0.3	-33.33	100	0.67	2
AMXD	60	30	100	-50	66.67	0.5	1.67
COVM	90	80	100	-11.11	11.11	0.89	1.11
UPTK	0.5	0	1	-100	100	0	2
BUD	1.35	1.215	1.485	-10	10	0.9	1.1
FC_WC	0.2775	0.197	0.34687	-29.01	25	0.71	1.25
WP	0.1054	0.07905	0.13175	-25	25	0.75	1.25
PDRA	0.0893	0.04465	0.1786	-50	100	0.5	2
FEXT	0.1	0.05	0.15	-50	50	0.5	1.5
HENR	1.22E-3	1.22E-4	1.22E-2	-90	900	0.1	10
DEGR	0.0893	0.04465	0.1786	-50	100	0.5	2
QTEN	2.2	1.82	2.72	-17.27	23.64	0.83	1.24
ASM	27.75	19.7	34.6875	-29.01	25	0.71	1.25
MEXP	0.7	0.42	0.98	-40	40	0.6	1.4
KF	0.34	0.17	0.68	-50	100	0.5	2
NF	0.9	0.72	1.08	-20	20	0.8	1.2

Appendix 63. Variation attributed to PELMO input parameters for the one-at-a-time sensitivity analysis *Pesticide L on Wick* scenario

	Initial value	Absolute values		Perc. of variation		Multiplication factor	
		Min	Max	Min	Max	Min	Max
ANET	15	5	25	-66.67	66.67	0.33	1.67
CINT	0.15	0.1	0.3	-33.33	100	0.67	2
AMXD	60	30	100	-50	66.67	0.5	1.67
COVM	90	80	100	-11.11	11.11	0.89	1.11
UPTK	0.5	0	1	-100	100	0	2
BUD	1.35	1.215	1.485	-10	10	0.9	1.1
FC_WC	0.2775	0.20812	0.34687	-25	25	0.75	1.25
WP	0.1054	0.07905	0.13175	-25	25	0.75	1.25
PDRA	0.0298	0.0149	0.0596	-50	100	0.5	2
FEXT	0.1	0.05	0.15	-50	50	0.5	1.5
HENR	1E-10	1E-11	1E-09	-90	900	0.1	10
DEGR	0.0298	0.0149	0.0596	-50	100	0.5	2
QTEN	2.2	1.82	2.72	-17.27	23.64	0.83	1.24
ASM	27.75	19.7	34.6875	-29.01	25	0.71	1.25
MEXP	0.7	0.42	0.98	-40	40	0.6	1.4
KF	1.7	0.85	3.4	-50	100	0.5	2
NF	0.9	0.72	1.08	-20	20	0.8	1.2

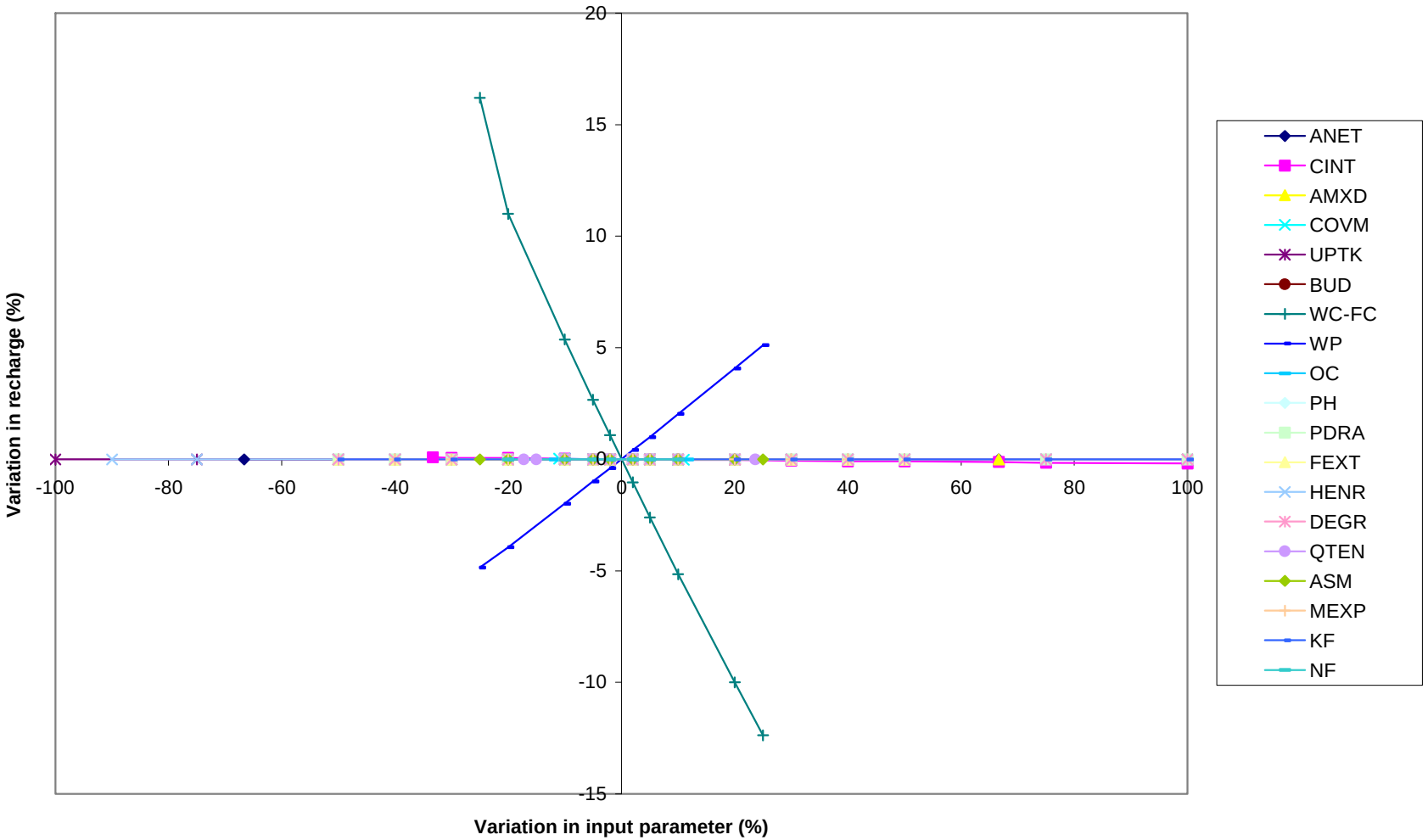
Appendix 64. Variation attributed to PELMO input parameters for the one-at-a-time sensitivity analysis *Pesticide T on Wick* scenario

	Initial value	Absolute values		Perc. of variation		Multiplication factor	
		Min	Max	Min	Max	Min	Max
ANET	15	5	25	-66.67	66.67	0.33	1.67
CINT	0.15	0.1	0.3	-33.33	100	0.67	2
AMXD	60	30	100	-50	66.67	0.5	1.67
COVM	90	80	100	-11.11	11.11	0.89	1.11
UPTK	0.5	0	1	-100	100	0	2
BUD	1.39	1.251	1.529	-10	10	0.9	1.1
FC_WC	0.349	0.26175	0.43625	-25	25	0.75	1.25
WP	0.168	0.126	0.21	-25	25	0.75	1.25
PDRA	0.0893	0.04465	0.1786	-50	100	0.5	2
FEXT	0.1	0.05	0.15	-50	50	0.5	1.5
HENR	1.22E-03	1.22E-04	1.22E-02	-90	900	0.1	10
DEGR	0.0893	0.04465	0.1786	-50	100	0.5	2
QTEN	2.2	1.82	2.72	-17.27	23.64	0.83	1.24
ASM	34.9	31.2	43.625	-10.60	25	0.89	1.25
MEXP	0.7	0.42	0.98	-40	40	0.6	1.4
KF	0.23	0.115	0.46	-50	100	0.5	2
NF	0.9	0.72	1.08	-20	20	0.8	1.2

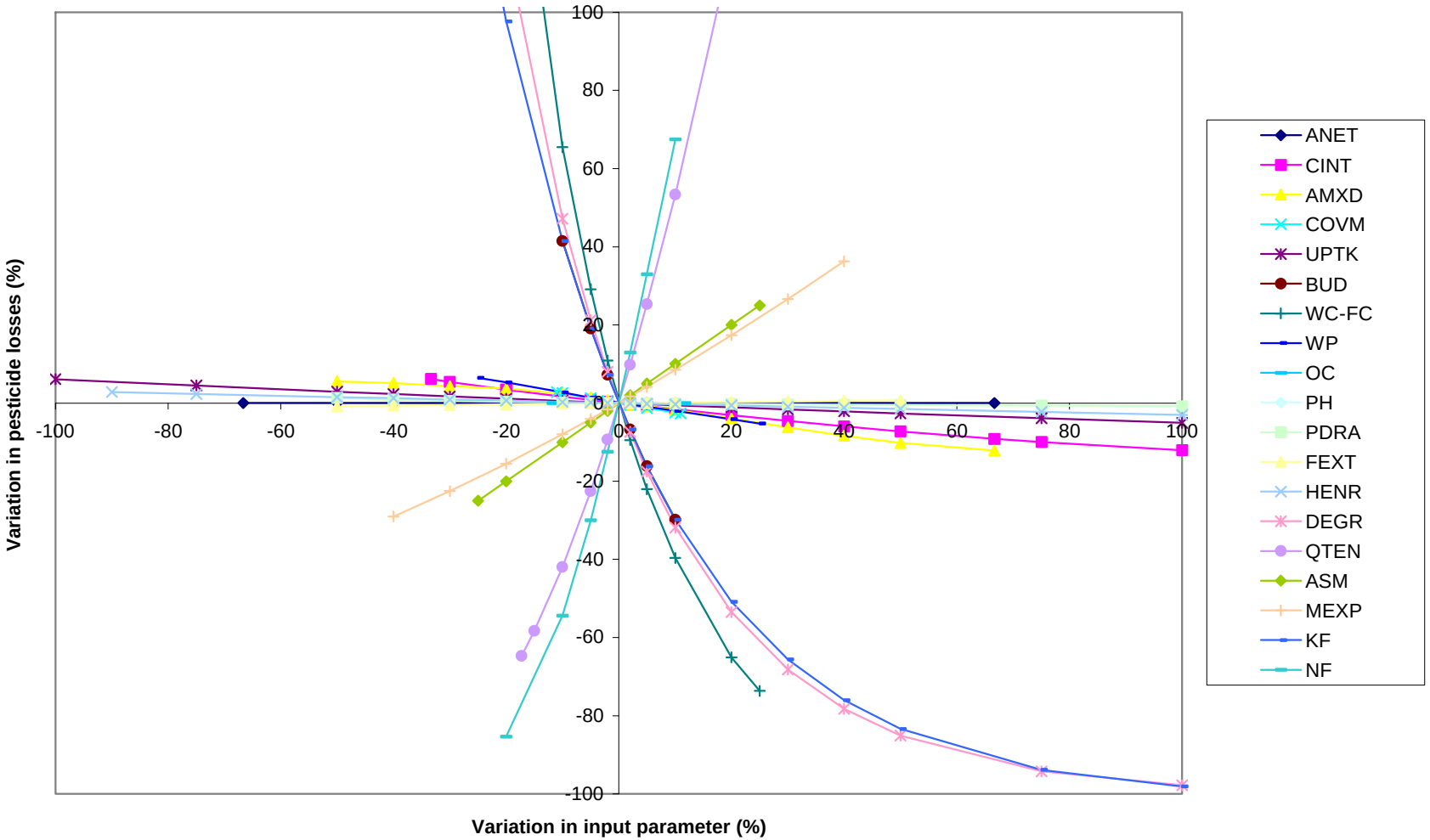
Appendix 65. Variation attributed to PELMO input parameters for the one-at-a-time sensitivity analysis *Pesticide L on Hodnet* scenario

	Initial value	Absolute values		Perc. of variation		Multiplication factor	
		Min	Max	Min	Max	Min	Max
ANET	15	5	25	-66.67	66.67	0.33	1.67
CINT	0.15	0.1	0.3	-33.33	100	0.67	2
AMXD	60	30	100	-50	66.67	0.5	1.67
COVM	90	80	100	-11.11	11.11	0.89	1.11
UPTK	0.5	0	1	-100	100	0	2
BUD	1.39	1.251	1.529	-10	10	0.9	1.1
FC_WC	0.349	0.26175	0.43625	-25	25	0.75	1.25
WP	0.168	0.126	0.21	-25	25	0.75	1.25
PDRA	0.0298	0.0149	0.0596	-50	100	0.5	2
FEXT	0.1	0.05	0.15	-50	50	0.5	1.5
HENR	1E-10	1E-11	1E-09	-90	900	0.1	10
DEGR	0.0298	0.0149	0.0596	-50	100	0.5	2
QTEN	2.2	1.82	2.72	-17.27	23.64	0.83	1.24
ASM	34.9	31.2	43.625	-10.60	25	0.89	1.25
MEXP	0.7	0.42	0.98	-40	40	0.6	1.4
KF	1.15	0.575	2.3	-50	100	0.5	2
NF	0.9	0.72	1.08	-20	20	0.8	1.2

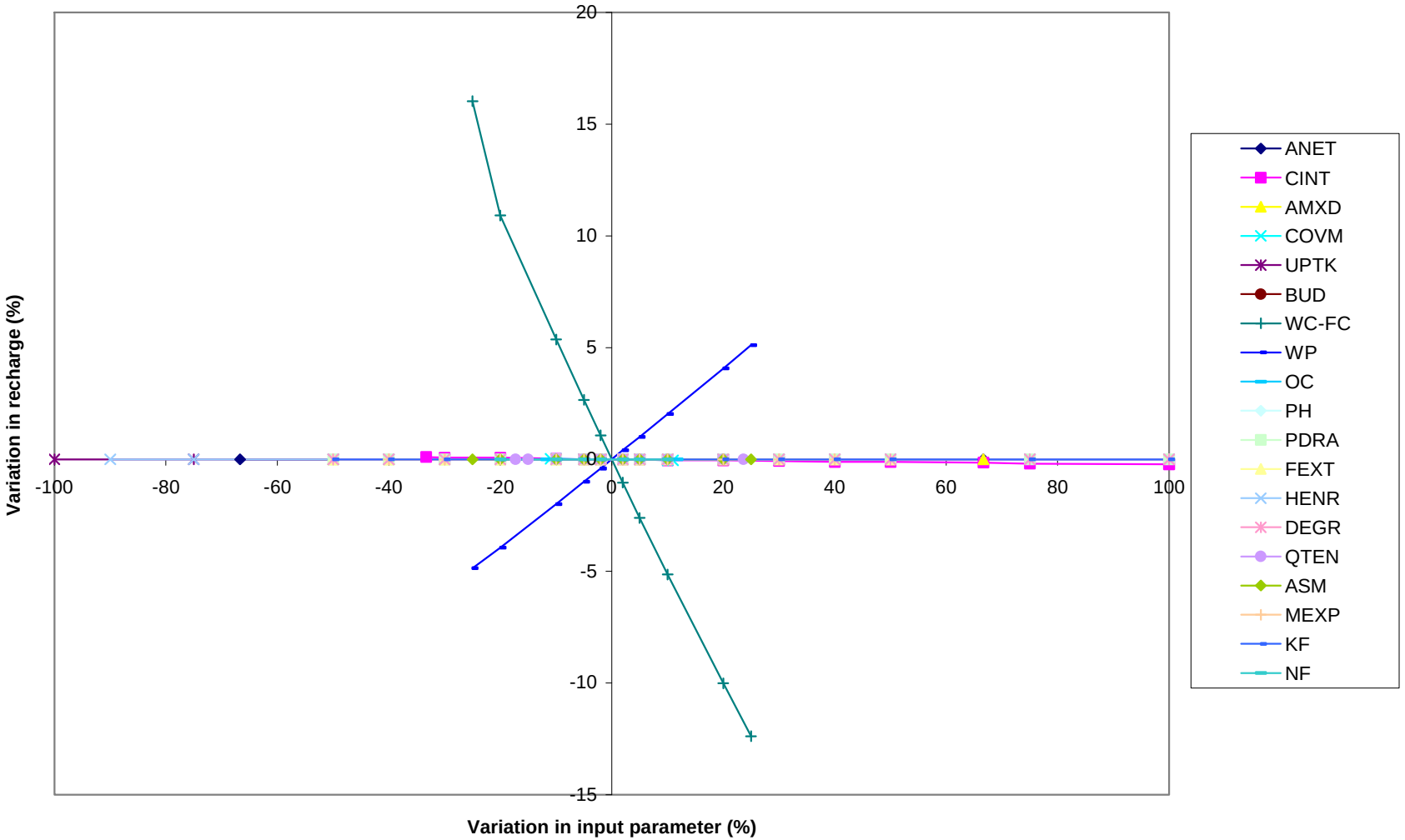
Appendix 66. Variation attributed to PELMO input parameters for the one-at-a-time sensitivity analysis *Pesticide T on Hodnet* scenario



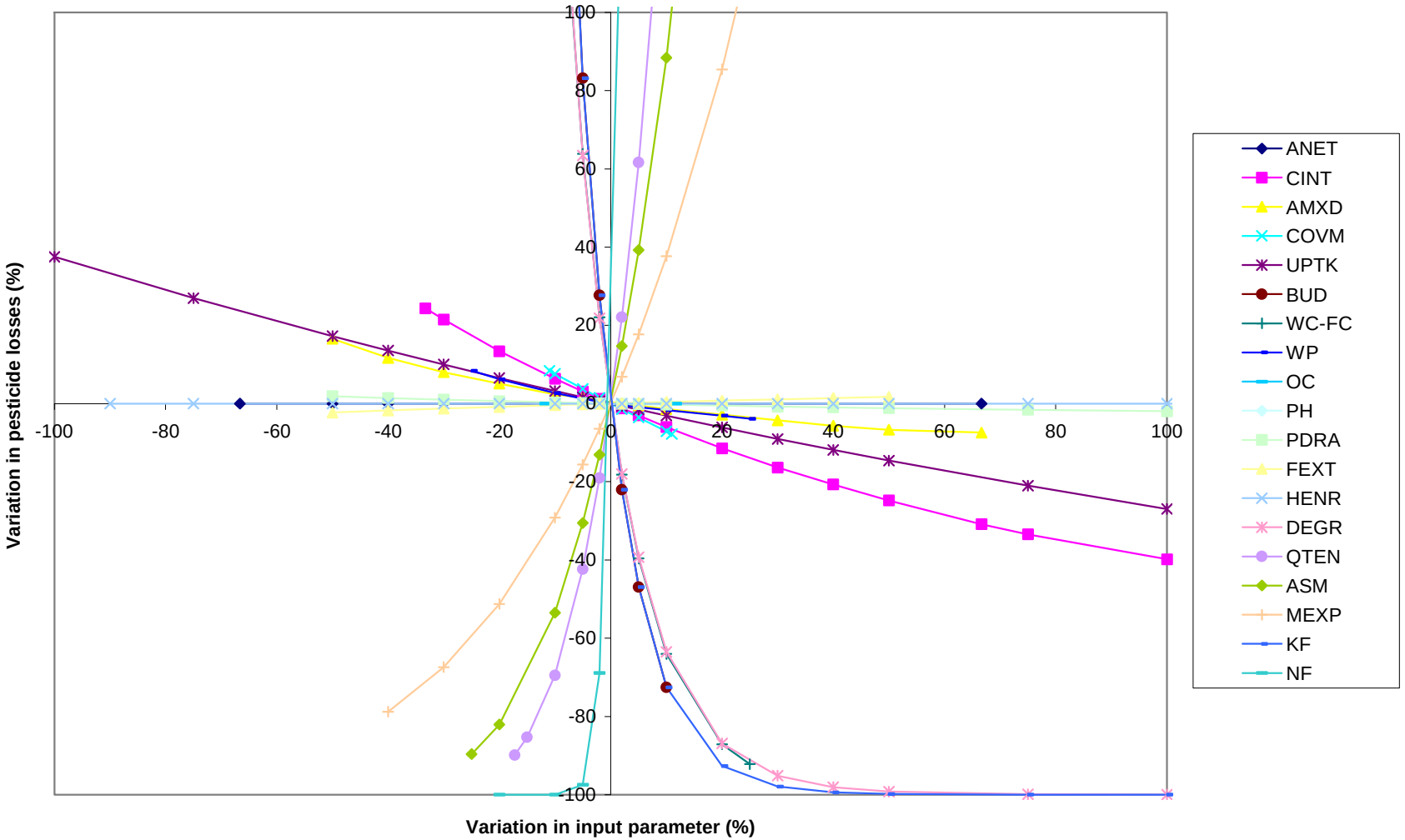
Appendix 67. Influence of the variation of input parameters on percolation results predicted by PELMO – *Pesticide L on Wick* scenario
The closer the curve to the Y-axis, the more influence the parameter has.



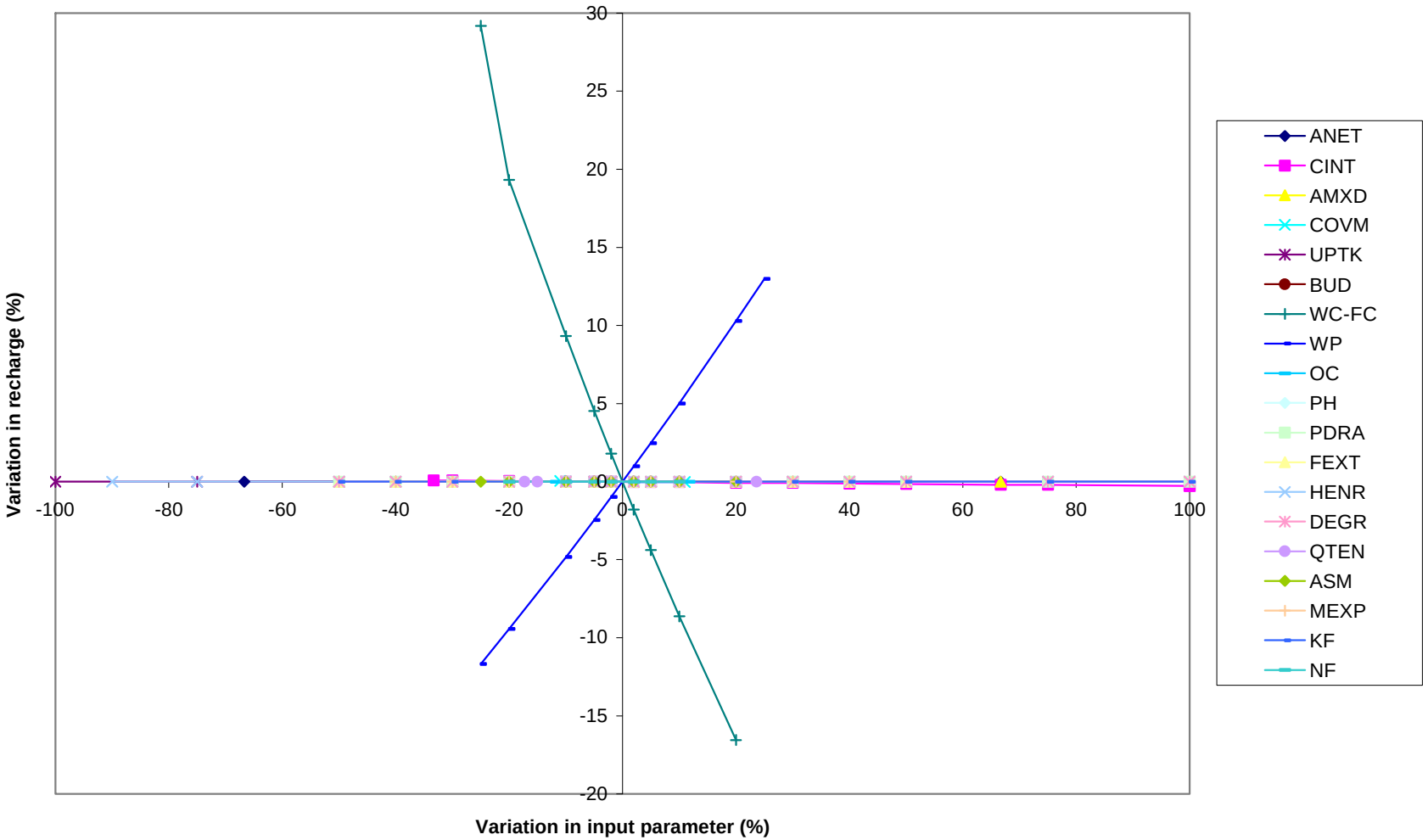
Appendix 68. Influence of the variation of input parameters on pesticide losses results predicted by PELMO – *Pesticide L on Wick* scenario
The closer the curve to the Y-axis, the more influence the parameter has.



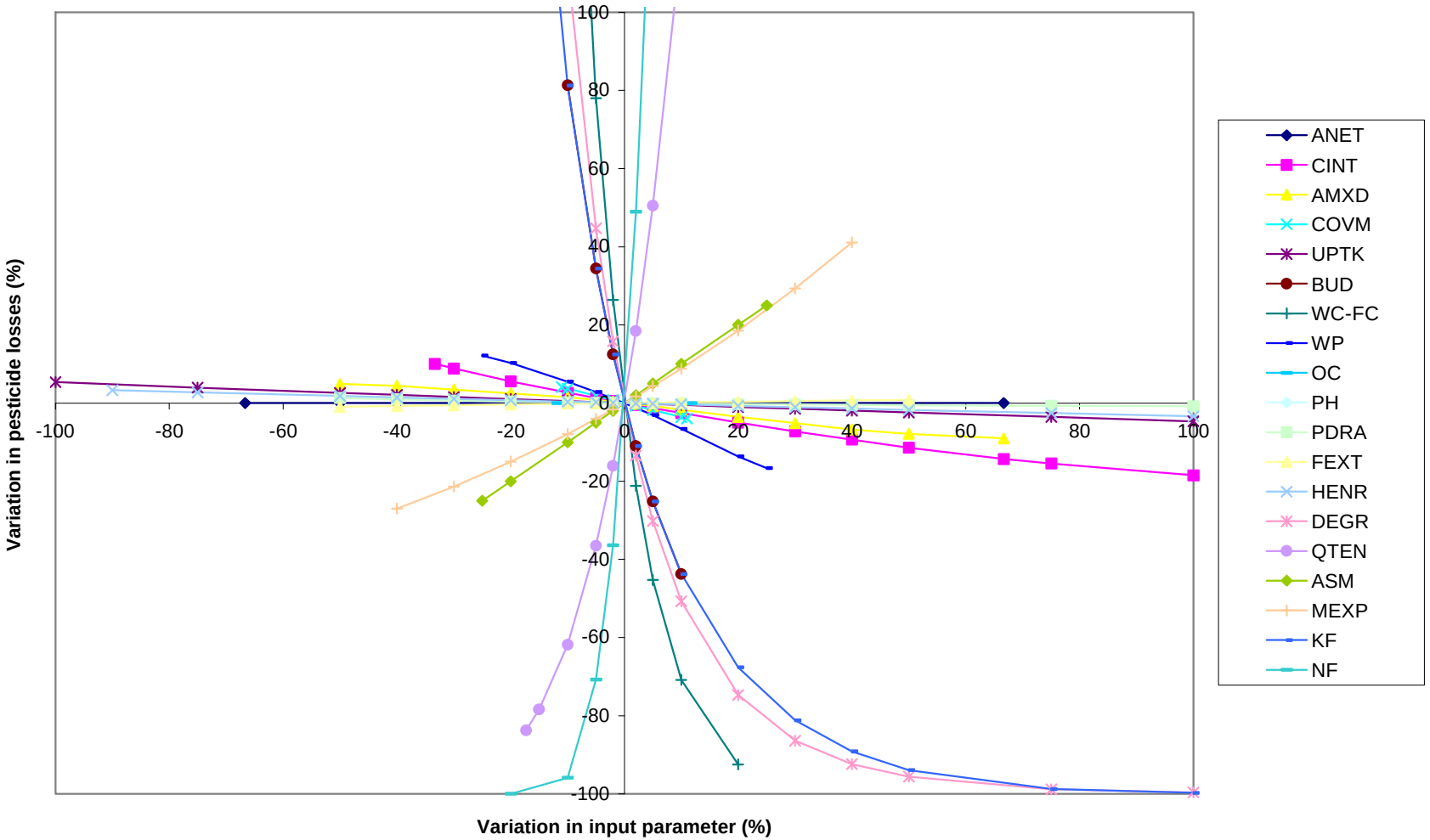
Appendix 69. Influence of the variation of input parameters on percolation results predicted by PELMO – *Pesticide T on Wick* scenario
The closer the curve to the Y-axis, the more influence the parameter has.



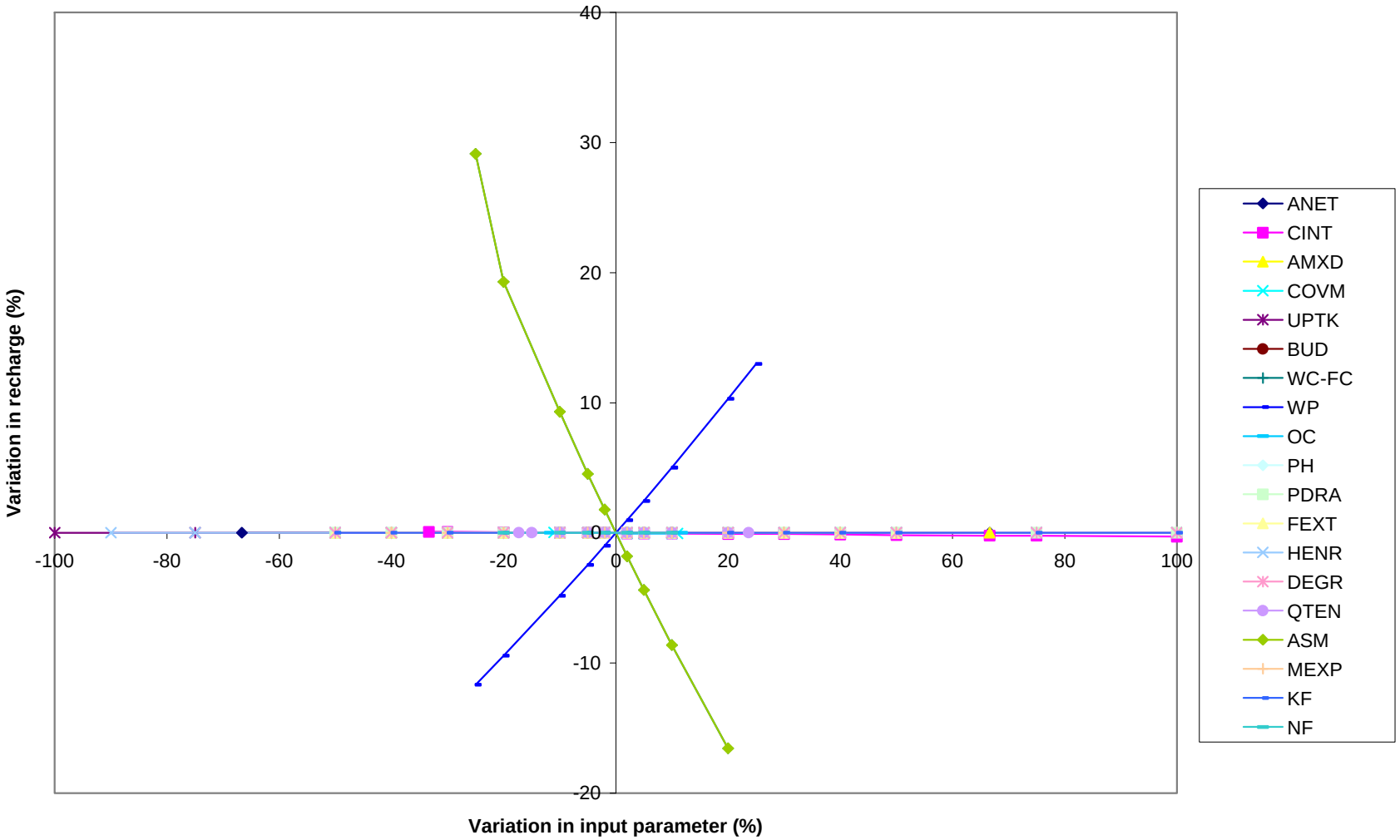
Appendix 70. Influence of the variation of input parameters on pesticide losses results predicted by PELMO – *Pesticide T on Wick* scenario
The closer the curve to the Y-axis, the more influence the parameter has.



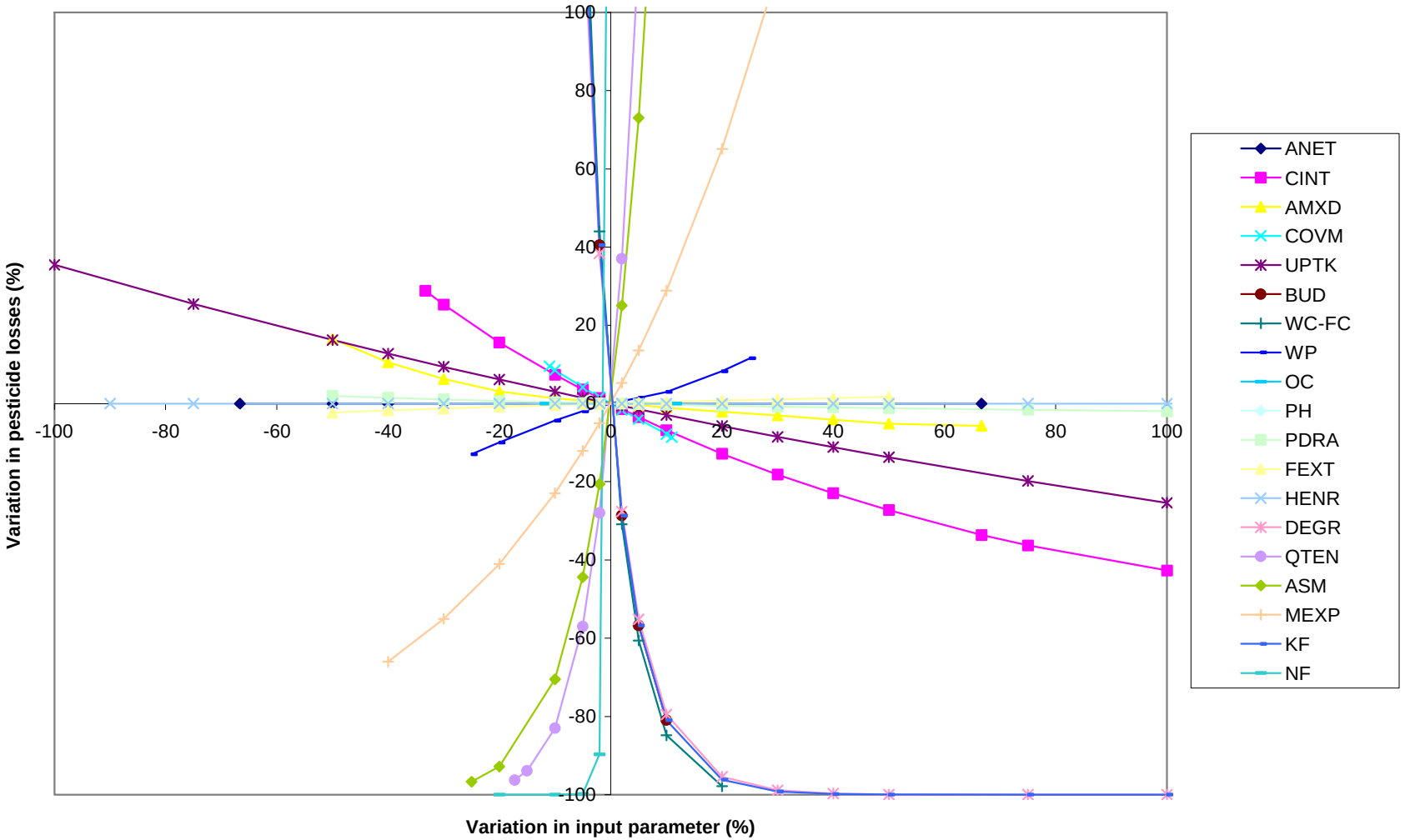
Appendix 71. Influence of the variation of input parameters on percolation results predicted by PELMO – *Pesticide L on Hodnet* scenario
The closer the curve to the Y-axis, the more influence the parameter has.



Appendix 72. Influence of the variation of input parameters on pesticide losses results predicted by PELMO – *Pesticide L on Hodnet* scenario
The closer the curve to the Y-axis, the more influence the parameter has.



Appendix 73. Influence of the variation of input parameters on percolation results predicted by PELMO – *Pesticide T on Hodnet* scenario
The closer the curve to the Y-axis, the more influence the parameter has.



Appendix 74. Influence of the variation of input parameters on pesticide losses results predicted by PELMO – *Pesticide T on Hodnet* scenario
The closer the curve to the Y-axis, the more influence the parameter has.

	Parameter	Description	MAROV	Influence
1	WC-FC-ASM	Water capacity – Field capacity	0.648	-
2	WP	Wilting point	0.208	+
3	CINT	Maximum interception storage	0.003	-
4	COVM	Maximum soil cover	0.003	-
	ANET	Depth of evapotranspiration computation	0	
	AMXD	Maximum active rooting depth	0	
	UPTK	Plant uptake efficiency factor	0	
	BUD	Bulk density	0	
	PDRA	Plant decay rate	0	
	FEXT	Foliar extraction coefficient	0	
	HENR	Henry's constant	0	
	DEGR	Degradation rate	0	
	QTEN	Increase given a temperature increase of 10°C	0	
	MEXP	Exponent for moisture correction	0	
	ASM	Soil moisture during the degradation exp.	0	
	KF	Freundlich sorption coefficient	0	
	NF	Freundlich exponent	0	

Appendix 75. Classification of PELMO input parameters according to their influence on recharge results for the *Pesticide L on Wick* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in recharge.

	Parameter	Description	MAROV	Influence
1	DEGR	Degradation rate	12.345	-
2	WC-FC	Water capacity - Field capacity	10.342	-
3	KF	Freundlich sorption coefficient	7.536	-
4	NF	Freundlich exponent	6.746	+
5	QTEN	Increase given a temperature increase of 10°C	5.983	+
6	BUD	Bulk density	4.147	-
7	ASM	Soil moisture during the degradation exp.	3.002	+
8	MEXP	Exponent for moisture correction	0.906	+
9	AMXD	Maximum active rooting depth	0.375	-
10	WP	Wilting point	0.288	-
11	COVM	Maximum soil cover	0.255	-
12	CINT	Maximum interception storage	0.184	-
13	UPTK	Plant uptake efficiency factor	0.061	-
14	HENR	Henry's constant	0.045	-
15	PDRA	Plant decay rate	0.026	-
16	FEXT	Foliar extraction coefficient	0.021	+
	ANET	Depth of evapotranspiration computation	0	

Appendix 76. Classification of PELMO input parameters according to their influence on pesticide losses for the *Pesticide L on Wick* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in pesticide losses

	Parameter	Description	MAROV	Influence
1	WC-FC	Water capacity – Field capacity	0.641	-
2	WP	Wilting point	0.208	+
3	CINT	Maximum interception storage	0.004	-
4	COVM	Maximum soil cover	0.004	-
	ANET	Depth of evapotranspiration computation	0	
	AMXD	Maximum active rooting depth	0	
	UPTK	Plant uptake efficiency factor	0	
	BUD	Bulk density	0	
	PDRA	Plant decay rate	0	
	FEXT	Foliar extraction coefficient	0	
	HENR	Henry's constant	0	
	DEGR	Degradation rate	0	
	QTEN	Increase given a temperature increase of 10°C	0	
	MEXP	Exponent for moisture correction	0	
	ASM	Soil moisture during the degradation exp.	0	
	KF	Freundlich sorption coefficient	0	
	NF	Freundlich exponent	0	

Appendix 77. Classification of PELMO input parameters according to their influence on recharge results for the *Pesticide T on Wick* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in recharge

	Parameter	Description	MAROV	Influence
1	KF	Freundlich sorption coefficient	274.312	-
2	DEGR	Degradation rate	197.923	-
3	NF	Freundlich exponent	167.301	+
4	WC-FC-ASM	Water capacity – Field capacity	37.750	-
5	BUD	Bulk density	23.175	-
6	QTEN	Increase given a temperature increase of 10°C	22.288	+
7	ASM	Soil moisture during the degradation exp.	12.230	+
8	MEXP	Exponent for moisture correction	5.424	+
9	COVM	Maximum soil cover	0.762	-
10	CINT	Maximum interception storage	0.730	-
11	UPTK	Plant uptake efficiency factor	0.375	-
12	AMXD	Maximum active rooting depth	0.343	-
13	WP	Wilting point	0.335	-
14	FEXT	Foliar extraction coefficient	0.046	+
15	PDRA	Plant decay rate	0.038	-
	ANET	Depth of evapotranspiration computation	0	
	HENR	Henry's constant	0	

Appendix 78. Classification of PELMO input parameters according to their influence on pesticide losses for the *Pesticide T on Wick* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in pesticide losses

	Parameter	Description	MAROV	Influence
1	WC-FC	Water capacity – Field capacity	1.167	-
2	WP	Wilting point	0.519	+
3	CINT	Maximum interception storage	0.019	-
4	COVM	Maximum soil cover	0.019	-
	ANET	Depth of evapotranspiration computation	0	
	AMXD	Maximum active rooting depth	0	
	UPTK	Plant uptake efficiency factor	0	
	BUD	Bulk density	0	
	PDRA	Plant decay rate	0	
	FEXT	Foliar extraction coefficient	0	
	HENR	Henry's constant	0	
	DEGR	Degradation rate	0	
	QTEN	Increase given a temperature increase of 10°C	0	
	MEXP	Exponent for moisture correction	0	
	ASM	Soil moisture during the degradation exp.	0	
	KF	Freundlich sorption coefficient	0	
	NF	Freundlich exponent	0	

Appendix 79. Classification of PELMO input parameters according to their influence on recharge results for the *Pesticide L on Hodnet* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in recharge

	Parameter	Description	MAROV	Influence
1	DEGR	Degradation rate	110.485	-
2	WC-FC	Water capacity – Field capacity	67.764	-
3	NF	Freundlich exponent	36.750	+
4	KF	Freundlich sorption coefficient	34.477	-
5	QTEN	Increase given a temperature increase of 10°C	17.262	+
6	BUD	Bulk density	8.129	-
7	ASM	Soil moisture during the degradation exp.	7.319	+
8	MEXP	Exponent for moisture correction	1.028	+
9	WP	Wilting point	0.683	-
10	COVM	Maximum soil cover	0.376	-
11	CINT	Maximum interception storage	0.300	-
12	AMXD	Maximum active rooting depth	0.197	-
13	UPTK	Plant uptake efficiency factor	0.059	-
14	HENR	Henry's constant	0.039	-
15	PDRA	Plant decay rate	0.033	-
16	FEXT	Foliar extraction coefficient	0.033	+
	ANET	Depth of evapotranspiration computation	0	

Appendix 80. Classification of PELMO input parameters according to their influence on pesticide losses for the *Pesticide L on Hodnet* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in pesticide losses

	Parameter	Description	MAROV	Influence
1	WC-FC	Water capacity – Field capacity	1.165	-
2	WP	Wilting point	0.519	+
3	CINT	Maximum interception storage	0.020	-
4	COVM	Maximum soil cover	0.020	-
	ANET	Depth of evapotranspiration computation	0	
	AMXD	Maximum active rooting depth	0	
	UPTK	Plant uptake efficiency factor	0	
	BUD	Bulk density	0	
	PDRA	Plant decay rate	0	
	FEXT	Foliar extraction coefficient	0	
	HENR	Henry's constant	0	
	DEGR	Degradation rate	0	
	QTEN	Increase given a temperature increase of 10°C	0	
	MEXP	Exponent for moisture correction	0	
	ASM	Soil moisture during the degradation exp.	0	
	KF	Freundlich sorption coefficient	0	
	NF	Freundlich exponent	0	

Appendix 81. Classification of PELMO input parameters according to their influence on recharge results for the *Pesticide T on Hodnet* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in recharge

	Parameter	Description	MAROV	Influence
1	DEGR	Degradation rate	16384.020	-
2	KF	Freundlich sorption coefficient	14425.139	+
3	NF	Freundlich exponent	6923.228	+
4	WC-FC	Water capacity – Field capacity	450.205	-
5	QTEN	Increase given a temperature increase of 10°C	94.061	-
6	BUD	Bulk density	46.539	-
7	ASM	Soil moisture during the degradation exp.	31.998	+
8	MEXP	Exponent for moisture correction	4.160	+
9	CINT	Maximum interception storage	0.865	-
10	COVM	Maximum soil cover	0.864	-
11	WP	Wilting point	0.517	+
12	UPTK	Plant uptake efficiency factor	0.355	-
13	AMXD	Maximum active rooting depth	0.331	-
14	FEXT	Foliar extraction coefficient	0.046	+
15	PDRA	Plant decay rate	0.039	-
	ANET	Depth of evapotranspiration computation	0	
	HENR	Henry's constant	0.000	

Appendix 82. Classification of PELMO input parameters according to their influence on pesticide losses for the *Pesticide T on Hodnet* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in pesticide losses

		Wick		Hodnet	
		Pesticide L	Pesticide T	Pesticide L	Pesticide T
ANETD	Depth of evapotranspiration computation	0	0	0	0
CINTCP	Maximum interception storage	0.003	0.004	0.019	0.020
AMXDR	Maximum active rooting depth	0	0	0	0
COVMAX	Maximum soil cover	0.003	0.004	0.019	0.020
UPTKF	Plant uptake efficiency factor	0	0	0	0
BUD	Bulk density	0	0	0	0
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
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
MEXP	Exponent for moisture correction	0	0	0	0
ASM	Soil moisture during the degradation exp	0	0	0	0
KF	Freundlich sorption coefficient	0	0	0	0
NF	Freundlich exponent	0	0	0	0

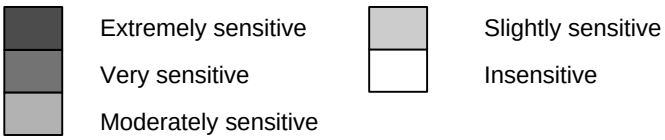
Appendix 83. Sensitivity indexes (MAROV values) of PELMO parameters with regard to recharge for the four scenarios

		Wick		Hodnet		
		Pesticide L	Pesticide T	Pesticide L	Pesticide T	Influence
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	
MEXP	Exponent for moisture correction	0	0	0	0	
ASM	Soil moisture during the degradation					
KF	Freundlich sorption coefficient	0	0	0	0	
NF	Freundlich exponent	0	0	0	0	

Appendix 84. Classification of PELMO parameters according to their influence on recharge (values presented are MAROV)

A positive (resp. negative) influence means that an increase in the value of the parameter will result in an increase (resp. decrease) of recharge

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



		Wick		Hodnet	
		Pesticide L	Pesticide T	Pesticide L	Pesticide T
WC-FC	Water capacity – Field capacity	1	1	1	1
WP	Wilting point	2	2	2	2
CINT	Maximum interception storage	3=	3=	3=	3=
COVM	Maximum soil cover	3=	3=	3=	3=
ANET	Depth of evapotranspiration computation	-	-	-	-
AMXD	Maximum active rooting depth	-	-	-	-
UPTK	Plant uptake efficiency factor	-	-	-	-
BUD	Bulk density	-	-	-	-
PDRA	Plant decay rate	-	-	-	-
FEXT	Foliar extraction coefficient	-	-	-	-
HENR	Henry's constant	-	-	-	-
DEGR	Degradation rate	-	-	-	-
QTEN	Increase given a temperature increase of 10°C	-	-	-	-
MEXP	Exponent for moisture correction	-	-	-	-
ASM	Soil moisture during degradation	-	-	-	-
KF	Freundlich sorption coefficient	-	-	-	-
NF	Freundlich exponent	-	-	-	-

Appendix 85. Ranking of PELMO input parameters as a function of their influence on recharge results
Parameters with the lowest ranking have the largest influence on recharge and vice versa

		Wick		Hodnet	
		Pesticide L	Pesticide T	Pesticide L	Pesticide T
ANETD	Depth of evapotranspiration computation	0	0	0	0
CINTCP	Maximum interception storage	0.184	0.730	0.300	0.865
AMXDR	Maximum active rooting depth	0.375	0.343	0.197	0.331
COVMAX	Maximum soil cover	0.255	0.762	0.376	0.864
UPTKF	Plant uptake efficiency factor	0.061	0.375	0.059	0.355
BUD	Bulk density	4.147	23.175	8.129	46.539
WC-FC	Water capacity – Field capacity	10.342	37.750	67.764	450.205
WP	Wilting point	0.288	0.335	0.683	0.517
PDRA	Plant decay rate	0.026	0.038	0.033	0.039
FEXT	Foliar extraction coefficient	0.021	0.046	0.033	0.046
HENR	Henry's constant	0.045	0.000	0.039	0.000
DEGR	Degradation rate	12.345	197.923	110.485	16384.020
QTEN	Increase given a temperature increase of 10°C	5.983	22.288	17.262	94.061
MEXP	Exponent for moisture correction	0.906	5.424	1.028	4.160
ASM	Soil moisture during degradation	3.002	12.230	7.319	31.998
KF	Freundlich sorption coefficient	7.536	274.312	34.477	14425.139
NF	Freundlich exponent	6.746	167.301	36.750	6923.228

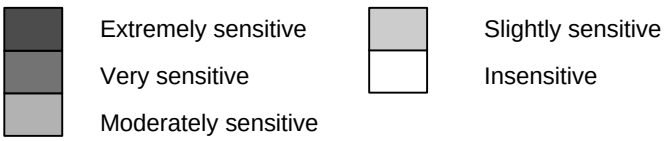
Appendix 86. Sensitivity indexes (MAROV values) of PELMO parameters with regard to pesticide losses for the four scenarios

		Wick		Hodnet		
		Pesticide L	Pesticide T	Pesticide L	Pesticide T	Influence
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	

Appendix 87. Classification of PELMO parameters according to their influence on pesticide losses (values presented are MAROV)

A positive (resp. negative) influence means that an increase in the value of the parameter will result in an increase (resp. decrease) of pesticide losses

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



		Wick		Hodnet	
		Pesticide L	Pesticide T	Pesticide L	Pesticide T
DEGR	Degradation rate	1	2	1	1
KF	Freundlich sorption coefficient	3	1	4	2
WC-FC	Water capacity – Field capacity	2	4	2	4
NF	Freundlich exponent	4	3	3	3
QTEN	Increase given a temperature increase of 10°C	5	6	5	5
BUD	Bulk density	6	5	6	6
ASM	Soil moisture during degradation	7	7	7	7
MEXP	Exponent for moisture correction	8	8	8	8
COVM	Maximum soil cover	11	9	10	10
CINT	Maximum interception storage	12	10	11	9
WP	Wilting point	10	13	9	11
AMXD	Maximum active rooting depth	9	12	12	13
UPTK	Plant uptake efficiency factor	13	11	13	12
FEXT	Foliar extraction coefficient	16	14	15	14
PDRA	Plant decay rate	15	15	15	15
HENR	Henry's constant	14	-	14	-
ANET	Depth of evapotranspiration computation	-	-	-	-

Appendix 88. Ranking of PELMO input parameters as a function of their influence on pesticide losses results

Parameter OLW	Description	Distribution	Mean	Variance	Min	Max
ANETD	Depth of evapotranspiration computation	Normal	15	2.60e+1	5	25
CINTCP	Maximum interception storage	Log-normal	0.15	8.90e-4	0.1	0.3
AMXDR	Maximum active rooting depth	Normal	60	2.34e+2	30	90
COVMAX	Maximum soil cover	Normal	90	2.60e+1	80	100
UPTKF	Plant uptake efficiency factor	Normal	0.5	6.51e-2	0	1
BUD	Bulk density	Normal	1.35	4.74e-3	1.215	1.485
WC-FC-ASM	Water capacity – Field capacity – Moisture for deg	Normal	0.2775	1.25e-3	0.2081	0.3469
WP	Wilting point	Normal	0.1054	2.89e-5	0.0949	0.1159
OC	Organic carbon content	Normal	1.7	1.04e-2	1.5	1.9
PH	Soil pH	Normal	6.5	2.75e-2	6.17	6.83
PDRA	Plant decay rate	Log-normal	0.0893	8.97e-4	0.0446	0.1786
FEXT	Foliar extraction coefficient	Log-normal	0.1	1.12e-3	0.05	0.2
HENR	Henry's constant	Log-normal	1.22e-3	1.67e-7	6.1e-4	2.44e-3
DEGR	Degradation rate	Log-normal	0.0893	8.97e-4	0.0446	0.1786
QTEN	Increase given a temperature increase of 10°C	Normal	2.2	7.87e-2	1.65	2.75
MEXP	Exponent for moisture correction	Normal	0.7	2.04e-2	0.42	0.98
KF	Freundlich sorption coefficient	Log-normal	0.34	1.30e-2	0.17	0.68
NF	Freundlich exponent	Normal	0.9	8.43e-3	0.72	1.08

Appendix 89. Probability distribution functions and their characteristics assigned to selected PELMO parameters in the Monte Carlo approach (Pesticide L on Wick scenario)

Parameter OTW	Description	Distribution	Mean	Variance	Min	Max
ANETD	Depth of evapotranspiration computation	Normal	15	2.60e+1	5	25
CINTCP	Maximum interception storage	Log-normal	0.15	8.90e-4	0.1	0.3
AMXDR	Maximum active rooting depth	Normal	60	2.34e+2	30	90
COVMAX	Maximum soil cover	Normal	90	2.60e+1	80	100
UPTKF	Plant uptake efficiency factor	Normal	0.5	6.51e-2	0	1
BUD	Bulk density	Normal	1.35	4.74e-3	1.215	1.485
WC-FC-ASM	Water capacity – Field capacity – Moisture for deg	Normal	0.2775	1.25e-3	0.2081	0.3469
WP	Wilting point	Normal	0.1054	2.89e-5	0.0949	0.1159
OC	Organic carbon content	Normal	1.7	1.04e-2	1.5	1.9
PH	Soil pH	Normal	6.5	2.75e-2	6.17	6.83
PDRA	Plant decay rate	Log-normal	0.0298	9.99e-5	0.0149	0.0596
FEXT	Foliar extraction coefficient	Log-normal	0.1	1.12e-3	0.05	0.2
HENR	Henry's constant	Log-normal	1e-10	1.12e-21	5e-11	2e-10
DEGR	Degradation rate	Log-normal	0.0298	9.99e-5	0.0149	0.0596
QTEN	Increase given a temperature increase of 10°C	Normal	2.2	7.87e-2	1.65	2.75
MEXP	Exponent for moisture correction	Normal	0.7	2.04e-2	0.42	0.98
KF	Freundlich sorption coefficient	Log-normal	1.7	3.25e-1	0.85	3.4
NF	Freundlich exponent	Normal	0.9	8.43e-3	0.72	1.08

Appendix 90. Probability distribution functions and their characteristics assigned to selected PELMO parameters in the Monte Carlo approach (Pesticide T on Wick scenario)

Parameter OLH	Description	Distribution	Mean	Variance	Min	Max
ANETD	Depth of evapotranspiration computation	Normal	15	2.60e+1	5	25
CINTCP	Maximum interception storage	Log-normal	0.15	8.90e-4	0.1	0.3
AMXDR	Maximum active rooting depth	Normal	60	2.34e+2	30	90
COVMAX	Maximum soil cover	Normal	90	2.60e+1	80	100
UPTKF	Plant uptake efficiency factor	Normal	0.5	6.51e-2	0	1
BUD	Bulk density	Normal	1.39	5.03e-3	1.25	1.53
WC-FC-ASM	Water capacity – Field capacity – Moisture for deg	Normal	0.349	1.98e-3	0.262	0.436
WP	Wilting point	Normal	0.168	7.34e-5	0.151	0.185
OC	Organic carbon content	Normal	1.15	4.77e-3	1.01	1.29
PH	Soil pH	Normal	6.7	2.92e-2	6.36	7.03
PDRA	Plant decay rate	Log-normal	0.0893	8.97e-4	0.0446	0.1786
FEXT	Foliar extraction coefficient	Log-normal	0.1	1.12e-3	0.05	0.2
HENR	Henry's constant	Log-normal	1.22e-3	1.67e-7	6.1e-4	2.44e-3
DEGR	Degradation rate	Log-normal	0.0893	8.97e-4	0.0446	0.1786
QTEN	Increase given a temperature increase of 10°C	Normal	2.2	7.87e-2	1.65	2.75
MEXP	Exponent for moisture correction	Normal	0.7	2.04e-2	0.42	0.98
KF	Freundlich sorption coefficient	Log-normal	0.23	5.95e-3	0.115	0.46
NF	Freundlich exponent	Normal	0.9	8.43e-3	0.72	1.08

Appendix 91. Probability distribution functions and their characteristics assigned to selected PELMO parameters in the Monte Carlo approach (Pesticide L on Hodnet scenario)

Parameter OLH	Description	Distribution	Mean	Variance	Min	Max
ANETD	Depth of evapotranspiration computation	Normal	15	2.60e+1	5	25
CINTCP	Maximum interception storage	Log-normal	0.15	8.90e-4	0.1	0.3
AMXDR	Maximum active rooting depth	Normal	60	2.34e+2	30	90
COVMAX	Maximum soil cover	Normal	90	2.60e+1	80	100
UPTKF	Plant uptake efficiency factor	Normal	0.5	6.51e-2	0	1
BUD	Bulk density	Normal	1.39	5.03e-3	1.25	1.53
WC-FC-ASM	Water capacity – Field capacity – Moisture for deg	Normal	0.349	1.98e-3	0.262	0.436
WP	Wilting point	Normal	0.168	7.34e-5	0.151	0.185
OC	Organic carbon content	Normal	1.15	4.77e-3	1.01	1.29
PH	Soil pH	Normal	6.7	2.92e-2	6.36	7.03
PDRA	Plant decay rate	Log-normal	0.0298	9.99e-5	0.0149	0.0596
FEXT	Foliar extraction coefficient	Log-normal	0.1	1.12e-3	0.05	0.2
HENR	Henry's constant	Log-normal	1e-10	1.12e-21	5e-11	2e-10
DEGR	Degradation rate	Log-normal	0.0298	9.99e-5	0.0149	0.0596
QTEN	Increase given a temperature increase of 10°C	Normal	2.2	7.87e-2	1.65	2.75
MEXP	Exponent for moisture correction	Normal	0.7	2.04e-2	0.42	0.98
KF	Freundlich sorption coefficient	Log-normal	1.15	1.49e-1	0.57	2.30
NF	Freundlich exponent	Normal	0.9	8.43e-3	0.72	1.08

Appendix 92. Probability distribution functions and their characteristics assigned to selected PELMO parameters in the Monte Carlo approach (Pesticide T on Hodnet scenario)

Parameter OLW	Mean	Standard deviation	Variance	Min	Max
ANETD	15.0015	4.4548	19.8455	5.1659	24.9965
CINTCP	0.1515	0.0290	0.0008	0.1001	0.2805
AMXDR	59.9963	13.3608	178.5110	30.1117	89.2723
COVMAX	90.0013	4.4502	19.8042	80.2777	99.9317
UPTKF	0.5000	0.2227	0.0496	0.0042	0.9923
BUD	1.3500	0.0601	0.0036	1.2175	1.4833
WC-FC-ASM	0.2775	0.0309	0.0010	0.2102	0.3465
WP	0.1054	0.0047	0.0000	0.0949	0.1157
OC	1.7000	0.0891	0.0079	1.5020	1.8954
PH	6.4999	0.1448	0.0210	6.1772	6.8158
PDRA	0.0893	0.0268	0.0007	0.0452	0.1763
FEXT	0.1000	0.0300	0.0009	0.0506	0.1931
HENR	1.22E-03	3.67E-04	1.35E-07	6.18E-04	2.42E-03
DEGR	0.0893	0.0268	0.0007	0.0455	0.1721
QTEN	2.2001	0.2449	0.0600	1.6667	2.7434
MEXP	0.7000	0.1247	0.0156	0.4207	0.9733
KF	0.3400	0.1023	0.0105	0.1709	0.6603
NF	0.8787	0.0655	0.0043	0.7226	0.9892

Appendix 93. Characteristics of the series of parameters generated by Monte Carlo sampling (PELMO, Pesticide L on Wick scenario)

Parameter OTW	Mean	Standard deviation	Variance	Min	Max
ANETD	15.0044	4.4563	19.8587	5.2464	24.9330
CINTCP	0.1514	0.0285	0.0008	0.1010	0.2508
AMXDR	59.9968	13.3590	178.4623	30.8010	89.7520
COVMAX	90.0014	4.4575	19.8693	80.2140	99.9930
UPTKF	0.5000	0.2227	0.0496	0.0028	0.9930
BUD	1.3500	0.0602	0.0036	1.2168	1.4828
WC-FC-ASM	0.2775	0.0310	0.0010	0.2090	0.3468
WP	0.1054	0.0047	0.0000	0.0951	0.1159
OC	1.7000	0.0891	0.0079	1.5048	1.8993
PH	6.4999	0.1448	0.0210	6.1782	6.8162
PDRA	0.0298	0.0089	0.0001	0.0150	0.0579
FEXT	0.1000	0.0301	0.0009	0.0506	0.1983
HENR	1.00E-10	3.00E-11	9.00E-22	5.09E-11	1.96E-10
DEGR	0.0298	0.0090	0.0001	0.0151	0.0592
QTEN	2.2000	0.2451	0.0601	1.6539	2.7481
MEXP	0.7000	0.1246	0.0155	0.4271	0.9732
KF	1.7005	0.5114	0.2616	0.8655	3.3735
NF	0.8787	0.0655	0.0043	0.7208	0.9900

Appendix 94. Characteristics of the series of parameters generated by Monte Carlo sampling (PELMO, Pesticide T on Wick scenario)

Parameter OLH	Mean	Standard deviation	Variance	Min	Max
ANETD	14.9618	4.4974	20.2266	5.2990	24.9140
CINTCP	0.1515	0.0286	0.0008	0.1022	0.2703
AMXDR	59.7788	13.5184	182.7474	30.5020	89.1450
COVMAX	89.9742	4.4333	19.6544	80.1010	99.7030
UPTKF	0.5040	0.2226	0.0496	0.0070	0.9959
BUD	1.3860	0.0597	0.0036	1.2544	1.5240
WC-FC-ASM	0.3464	0.0373	0.0014	0.2642	0.4317
WP	0.1679	0.0075	0.0001	0.1514	0.1844
OC	1.1512	0.0596	0.0036	1.0158	1.2850
PH	6.6979	0.1479	0.0219	6.3709	7.0266
PDRA	0.0891	0.0265	0.0007	0.0463	0.1723
FEXT	0.1004	0.0302	0.0009	0.0508	0.1956
HENR	1.22E-03	3.72E-04	1.38E-07	6.11E-04	2.42E-03
DEGR	0.0899	0.0271	0.0007	0.0460	0.1785
QTEN	2.1977	0.2453	0.0602	1.6665	2.7492
MEXP	0.7007	0.1251	0.0157	0.4230	0.9747
KF	0.2310	0.0707	0.0050	0.1172	0.4785
NF	0.8799	0.0647	0.0042	0.7216	0.9892

Appendix 95. Characteristics of the series of parameters generated by Monte Carlo sampling (PELMO, Pesticide L on Hodnet scenario)

Parameter OTH	Mean	Standard deviation	Variance	Min	Max
ANETD	14.9372	4.5184	20.4164	5.2921	24.7230
CINTCP	0.1518	0.0295	0.0009	0.1006	0.2767
AMXDR	59.8589	13.3182	177.3752	30.1830	89.2550
COVMAX	90.0256	4.4213	19.5481	80.2890	99.7090
UPTKF	0.5040	0.2254	0.0508	0.0089	0.9947
BUD	1.3865	0.0611	0.0037	1.2550	1.5254
WC-FC-ASM	0.3459	0.0372	0.0014	0.2642	0.4357
WP	0.1681	0.0074	0.0001	0.1516	0.1844
OC	1.1497	0.0599	0.0036	1.0163	1.2825
PH	6.6986	0.1498	0.0224	6.3720	7.0250
PDRA	0.0298	0.0090	0.0001	0.0151	0.0576
FEXT	0.0997	0.0298	0.0009	0.0510	0.1931
HENR	9.99E-11	3.05E-11	9.29E-22	5.01E-11	1.98E-10
DEGR	0.0296	0.0089	0.0001	0.0149	0.0583
QTEN	2.1954	0.2442	0.0596	1.6520	2.7486
MEXP	0.6989	0.1229	0.0151	0.4262	0.9790
KF	1.1591	0.3474	0.1207	0.5898	2.2285
NF	0.8784	0.0652	0.0042	0.7234	0.9899

Appendix 96. Characteristics of the series of parameters generated by Monte Carlo sampling (PELMO, Pesticide T on Hodnet scenario)

OLW scenario	**Recharge (mm)**	**Pesticide losses (g ha^{-1})**
Number of successful model runs	250	250
Basic statistics		
Minimum value	842.20	0.00
Mean value	965.20	59.57
Maximum value	1127.50	452.72
Range	285.30	452.72
Frequency		
Minimum value	842.20	0.00
25th-percentile value	924.90	5.65
Median value	963.45	28.81
75th-percentile value	1006.90	88.81
Maximum value	1127.50	452.72
Dispersion		
Standard deviation	57.83	75.56
Variance	3344.71	5708.71
Standard error of the mean	3.66	4.78
Coefficient of variation	0.06	1.27
Distribution shape		
Skewness	0.23	2.14
Kurtosis	-0.37	5.66

Appendix 97. Characteristics of recharge and pesticide losses as predicted by PELMO using Monte Carlo-generated input files (Pesticide L on Wick scenario)

OTW scenario	**Recharge (mm)**	**Pesticide losses (g ha^{-1})**
Number of successful model runs	250	250
Basic statistics		
Minimum value	1890.00	0.00
Mean value	2170.38	9.26
Maximum value	2540.40	192.01
Range	650.40	192.01
Frequency		
Minimum value	1890.00	0.00
25th-percentile value	2074.60	0.00
Median value	2164.55	0.18
75th-percentile value	2265.50	3.64
Maximum value	2170.38	9.26
Dispersion		
Standard deviation	131.53	25.81
Variance	17301.07	666.37
Standard error of the mean	8.32	1.63
Coefficient of variation	0.06	2.79
Distribution shape		
Skewness	0.20	4.26
Kurtosis	-0.41	20.28

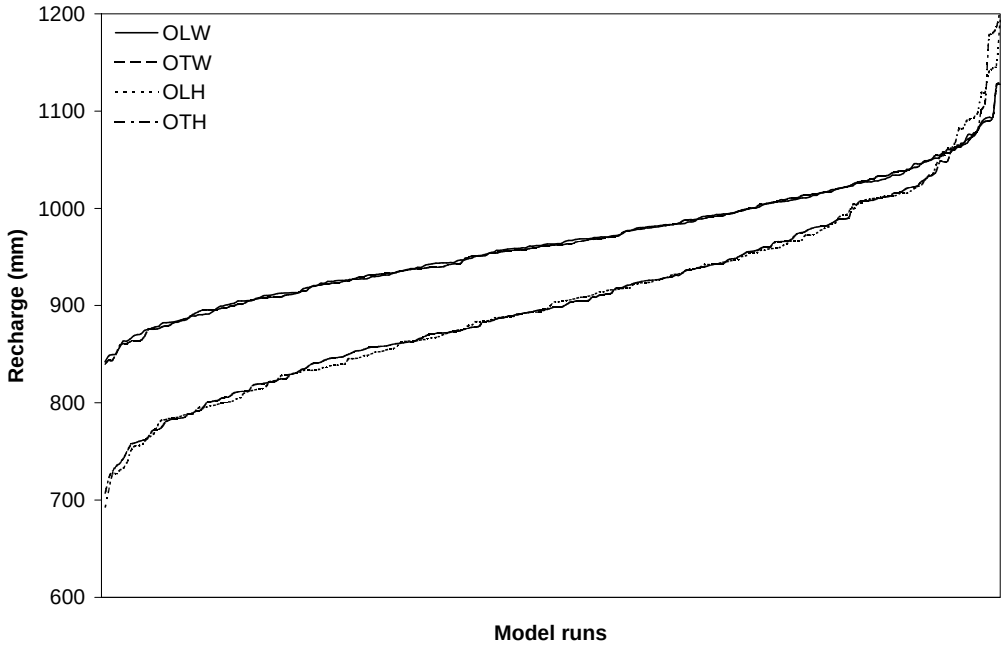
Appendix 98. Characteristics of recharge and pesticide losses as predicted by PELMO using Monte Carlo-generated input files (Pesticide T on Wick scenario)

OLH scenario	**Recharge (mm)**	**Pesticide losses (g ha^{-1})**
Number of successful model runs	240	240
Basic statistics		
Minimum value	1212.60	0.00
Mean value	1583.49	4.04
Maximum value	2091.10	63.82
Range	878.50	63.82
Frequency		
Minimum value	1212.60	0.00
25th-percentile value	2091.10	63.82
Median value	1578.75	0.39
75th-percentile value	1678.60	3.45
Maximum value	2091.10	63.82
Dispersion		
Standard deviation	161.51	8.99
Variance	26087.00	80.88
Standard error of the mean	10.43	0.58
Coefficient of variation	0.10	2.22
Distribution shape		
Skewness	0.38	3.55
Kurtosis	0.01	14.60

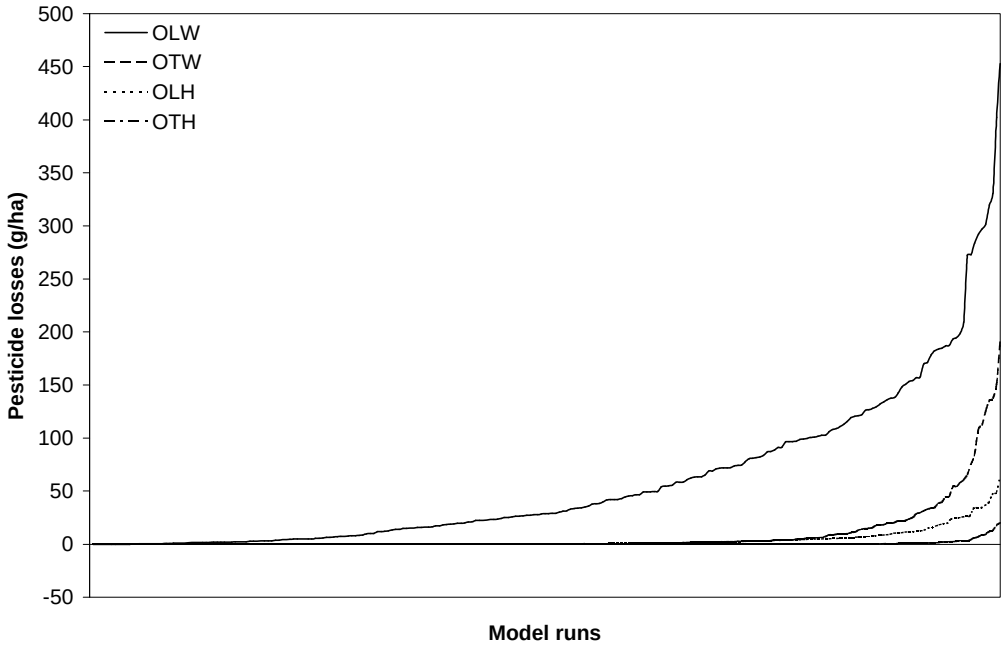
Appendix 99. Characteristics of recharge and pesticide losses as predicted by PELMO using Monte Carlo-generated input files (Pesticide L on Hodnet scenario)

OTH scenario	**Recharge (mm)**	**Pesticide losses (g ha^{-1})**
Number of successful model runs	238	238
Basic statistics		
Minimum value	1768.20	0.00
Mean value	2265.11	0.56
Maximum value	3007.40	20.08
Range	301.10	0.04
Frequency		
Minimum value	1768.20	0.00
25th-percentile value	2113.00	0.00
Median value	2244.55	0.00
75th-percentile value	2414.10	0.04
Maximum value	3007.40	20.08
Dispersion		
Standard deviation	228.41	2.29
Variance	52170.57	5.24
Standard error of the mean	14.81	0.15
Coefficient of variation	0.10	4.11
Distribution shape		
Skewness	14.81	0.15
Kurtosis	0.46	6.04

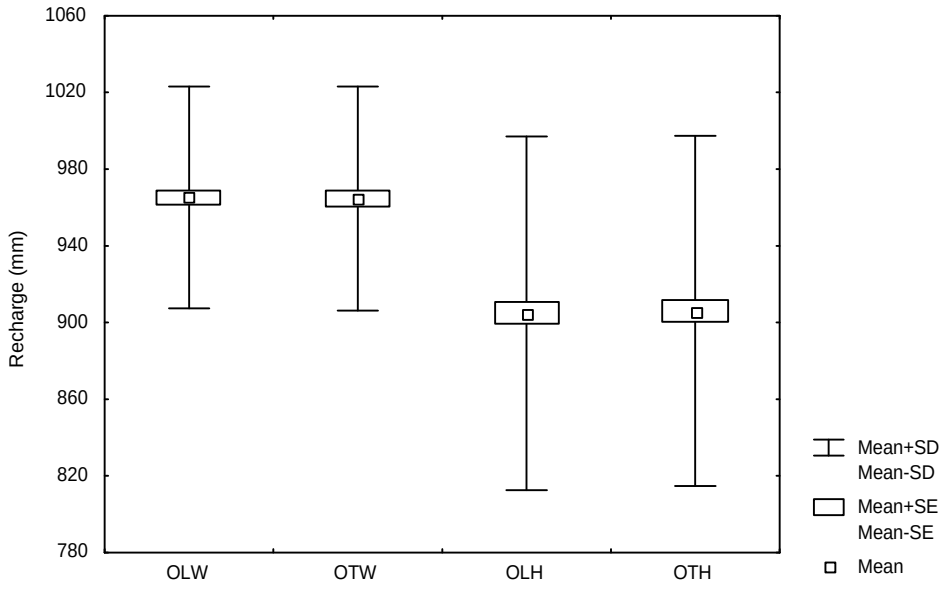
Appendix 100. Characteristics of recharge and pesticide losses as predicted by PELMO using Monte Carlo-generated input files (Pesticide T on Hodnet scenario)



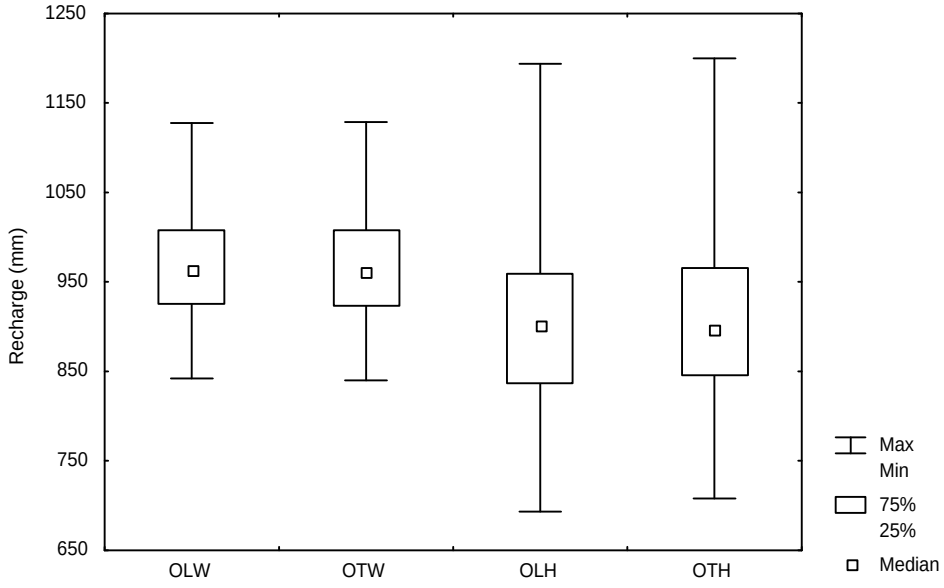
Appendix 101. Distribution of the recharge values obtained by running PELMO with the different Monte Carlo-generated input files for the four scenarios.
The values for OTW (runs over nine years), OTW (runs over seven years) and OTW (runs over ten years) have been scaled to represent equivalent values for four years.



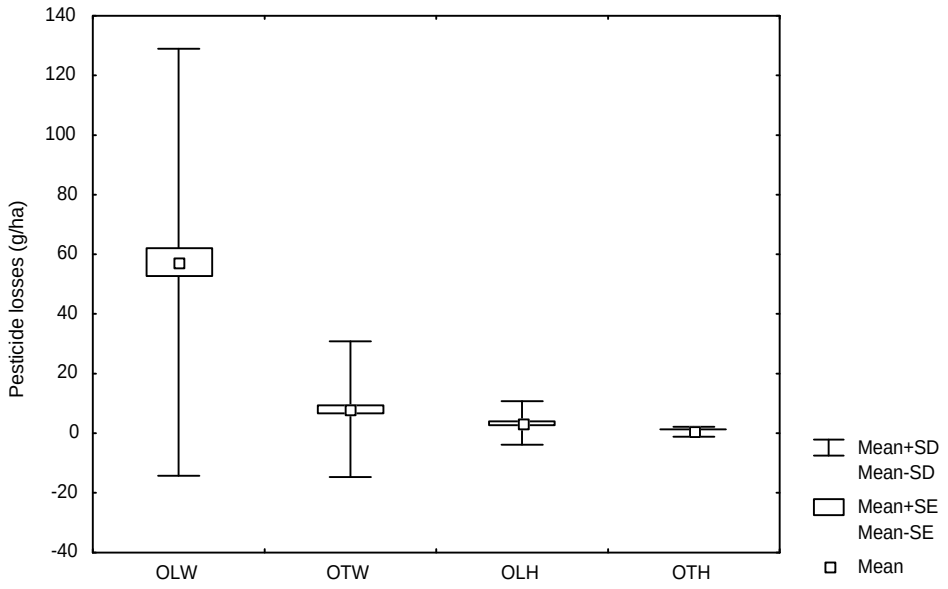
Appendix 102. Distribution of the values for pesticide losses obtained by running PELMO with the different Monte Carlo-generated input files for the four scenarios.



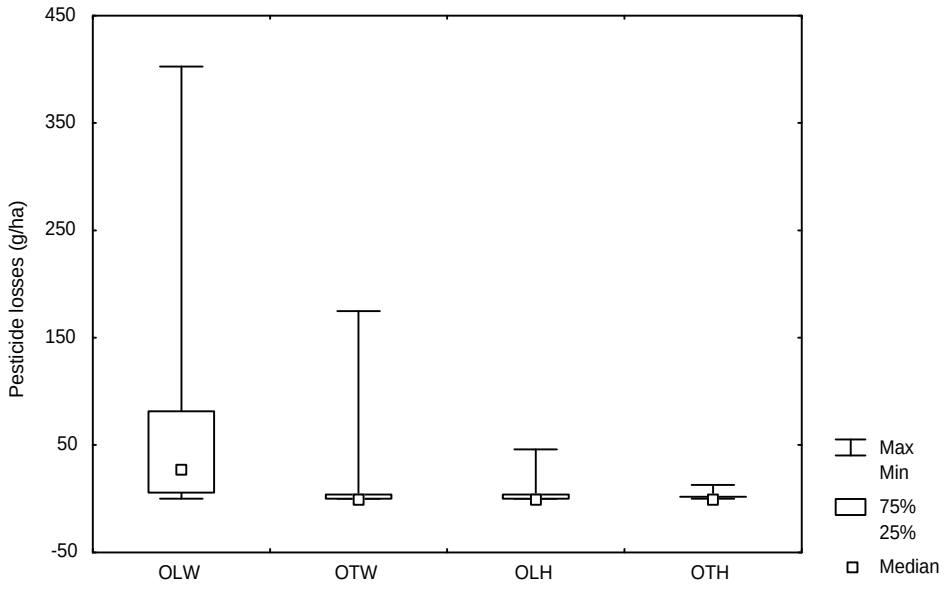
Appendix 103. Box plots presenting the mean, standard deviation and standard error of the mean for PELMO recharge values generated for the four scenarios
Values from OTW (9-year simulation), OLH (7-year simulation) and OTH (10-year simulation) have been scaled to an equivalent of a four-year simulation



Appendix 104. Box plots presenting the median, the lower and upper quartiles and minimum and maximum values of PELMO recharge values generated for the four scenarios
Values from OTW (9-year simulation), OLH (7-year simulation) and OTH (10-year simulation) have been scaled to an equivalent of a four-year simulation



Appendix 105. Box plots presenting the mean, standard deviation and standard error of the mean for values of pesticide losses generated by PELMO for the four scenarios



Appendix 106. Box plots presenting the median, the lower and upper quartiles and minimum and maximum values for pesticide losses generated by PELMO for the four scenarios

Recharge		
Ranking	Parameter	Betas
1	WC_FC	-0.9913
2	WP	0.1412
3	CINT	-0.0082
4	BUD	-0.0076
5	ASM	0.0064
6	KF	-0.0056
7	OC	-0.0055
8	COVM	0.0044
9	UPTK	-0.0042
10	MEXP	0.0037
11	HENR	-0.0034
12	PDRA	-0.0023
13	PH	0.0022
14	QTEN	0.0021
15	FEXT	0.0020
16	AMXD	0.0018
17	ANET	-0.0012
18	NF	-0.0009
19	DEGR	-0.0008

Pesticide losses		
Ranking	Parameter	Betas
1	DEGR	-0.6316
2	KF	-0.5054
3	WC_FC	-0.2931
4	QTEN	0.2860
5	NF	0.2400
6	ASM	0.1648
7	BUD	-0.1028
8	MEXP	0.0667
9	AMXD	-0.0363
10	CINT	-0.0287
11	FEXT	0.0256
12	WP	0.0176
13	UPTK	0.0128
14	COVM	0.0127
15	HENR	-0.0115
16	OC	0.0067
17	PDRA	-0.0060
18	ANET	-0.0016
19	PH	0.0006

Appendix 107. Classification of PELMO parameters according to their influence on recharge and pesticide losses, using the betas derived from a multiple linear regression on ranked data
Pesticide L on Wick scenario

Recharge		
Ranking	Parameter	Betas
1	WC_FC	-0.9812
2	WP	0.1369
3	FEXT	0.0068
4	AMXD	-0.0057
5	CINT	-0.0054
6	OC	-0.0043
7	UPTK	-0.0043
8	KF	0.0038
9	PH	-0.0034
10	BUD	-0.0029
11	COVM	-0.0028
12	PDRA	0.0027
13	DEGR	-0.0027
14	ANET	0.0026
15	NF	-0.0017
16	HENR	-0.0017
17	QTEN	0.0015
18	ASM	0.0011
19	MEXP	-0.0001

Pesticide losses		
Ranking	Parameter	Betas
1	KF	-0.5632
2	NF	0.5628
3	DEGR	-0.4369
4	WC_FC	-0.2111
5	QTEN	0.1523
6	MEXP	0.1038
7	ASM	0.1007
8	BUD	-0.0811
9	AMXD	-0.0603
10	WP	-0.0441
11	PH	-0.0224
12	FEXT	-0.0175
13	OC	-0.0156
14	UPTK	0.0089
15	COVM	-0.0078
16	CINT	0.0076
17	HENR	-0.0072
18	PDRA	0.0048
19	ANET	0.0010

Appendix 108. Classification of PELMO parameters according to their influence on recharge and pesticide losses, using the betas derived from a multiple linear regression on ranked data
Pesticide T on Wick scenario

Recharge		
Ranking	Parameter	Betas
1	WC_FC	-0.9711
2	WP	0.2084
3	ANET	-0.0115
4	PH	-0.0074
5	OC	0.0072
6	AMXD	-0.0070
7	KF	0.0059
8	NF	-0.0056
9	MEXP	0.0052
10	ASM	-0.0050
11	FEXT	0.0049
12	HENR	-0.0044
13	DEGR	0.0035
14	CINT	-0.0028
15	UPTK	0.0025
16	COVM	-0.0018
17	QTEN	-0.0008
18	BUD	0.0007
19	PDRA	-0.0007

Pesticide losses		
Ranking	Parameter	Betas
1	DEGR	-0.5302
2	KF	-0.4609
3	NF	0.4119
4	WC_FC	-0.3158
5	QTEN	0.2502
6	ASM	0.1296
7	BUD	-0.0661
8	ANET	-0.0370
9	MEXP	0.0300
10	AMXD	-0.0177
11	COVM	0.0144
12	UPTK	-0.0131
13	PDRA	-0.0113
14	CINT	-0.0106
15	WP	0.0094
16	PH	-0.0093
17	OC	0.0070
18	FEXT	-0.0067
19	HENR	0.0048

Appendix 109. Classification of PELMO parameters according to their influence on recharge and pesticide losses, using the betas derived from a multiple linear regression on ranked data
Pesticide L on Hodnet scenario

Recharge		
Ranking	Parameter	Betas
1	WC_FC	-0.9749
2	WP	0.2149
3	PDRA	0.0217
4	COVM	0.0110
5	AMXD	0.0093
6	ASM	-0.0086
7	CINT	-0.0080
8	UPTK	-0.0080
9	FEXT	-0.0075
10	MEXP	0.0072
11	ANET	0.0062
12	BUD	-0.0054
13	KF	-0.0035
14	PH	-0.0035
15	OC	-0.0026
16	HENR	0.0025
17	DEGR	0.0014
18	QTEN	0.0012
19	NF	0.0010

Pesticide losses		
Ranking	Parameter	Betas
1	NF	0.6755
2	KF	-0.4639
3	DEGR	-0.4251
4	WC_FC	-0.1697
5	QTEN	0.1458
6	ASM	0.1027
7	FEXT	-0.0500
8	BUD	-0.0420
9	MEXP	0.0326
10	AMXD	-0.0284
11	HENR	0.0193
12	CINT	-0.0152
13	UPTK	-0.0126
14	ANET	-0.0085
15	COVM	-0.0062
16	OC	-0.0056
17	PH	0.0056
18	PDRA	0.0033
19	WP	0.0019

Appendix 110. Classification of PELMO parameters according to their influence on recharge and pesticide losses, using the betas derived from a multiple linear regression on ranked data
Pesticide T on Hodnet scenario

	OLW		OTW		OLH		OTH	
	Beta	Rank	Beta	Rank	Beta	Rank	Beta	Rank
ANETD	-0.0012	17	0.0026	14	-0.0115	3	0.0062	11
CINTCP	-0.0082	3	-0.0054	5	-0.0028	14	-0.0080	7
AMXDR	0.0018	16	-0.0057	4	-0.0070	6	0.0093	5
COVMAX	0.0044	8	-0.0028	11	-0.0018	16	0.0110	4
UPTKF	-0.0042	9	-0.0043	7	0.0025	15	-0.0080	8
BUD	-0.0076	4	-0.0029	10	0.0007	18	-0.0054	12
WC_FC	-0.9913	1	-0.9812	1	-0.9711	1	-0.9749	1
WP	0.1412	2	0.1369	2	0.2084	2	0.2149	2
OC	-0.0055	7	-0.0043	6	0.0072	5	-0.0026	15
PH	0.0022	13	-0.0034	9	-0.0074	4	-0.0035	14
PDRA	-0.0023	12	0.0027	12	-0.0007	19	0.0217	3
FEXT	0.0020	15	0.0068	3	0.0049	11	-0.0075	9
HENR	-0.0034	11	-0.0017	16	-0.0044	12	0.0025	16
DEGR	-0.0008	19	-0.0027	13	0.0035	13	0.0014	17
QTEN	0.0021	14	0.0015	17	-0.0008	17	0.0012	18
ASM	0.0064	5	0.0011	18	-0.0050	10	-0.0086	6
MEXP	0.0037	10	-0.0001	19	0.0052	9	0.0072	10
KF	-0.0056	6	0.0038	8	0.0059	7	-0.0035	13
NF	-0.0009	18	-0.0017	15	-0.0056	8	0.0010	19

Appendix 111. Sensitivity of recharge in PELMO as calculated from the transformed data for the four scenarios.

The transformation consisted in replacing parameter values by their rank
Betas are the coefficients of a normalised regression
The ranking is calculated on absolute betas

	OLW		OTW		OLH		OTH	
	Beta	Rank	Beta	Rank	Beta	Rank	Beta	Rank
ANETD	-0.0016	18	0.0010	19	-0.0370	8	-0.0085	14
CINTCP	-0.0287	10	0.0076	16	-0.0106	14	-0.0152	12
AMXDR	-0.0363	9	-0.0603	9	-0.0177	10	-0.0284	10
COVMAX	0.0127	14	-0.0078	15	0.0144	11	-0.0062	15
UPTKF	0.0128	13	0.0089	14	-0.0131	12	-0.0126	13
BUD	-0.1028	7	-0.0811	8	-0.0661	7	-0.0420	8
WC_FC	-0.2931	3	-0.2111	4	-0.3158	4	-0.1697	4
WP	0.0176	12	-0.0441	10	0.0094	15	0.0019	19
OC	0.0067	16	-0.0156	13	0.0070	17	-0.0056	16
PH	0.0006	19	-0.0224	11	-0.0093	16	0.0056	17
PDRA	-0.0060	17	0.0048	18	-0.0113	13	0.0033	18
FEXT	0.0256	11	-0.0175	12	-0.0067	18	-0.0500	7
HENR	-0.0115	15	-0.0072	17	0.0048	19	0.0193	11
DEGR	-0.6316	1	-0.4369	3	-0.5302	1	-0.4251	3
QTEN	0.2860	4	0.1523	5	0.2502	5	0.1458	5
ASM	0.1648	6	0.1007	7	0.1296	6	0.1027	6
MEXP	0.0667	8	0.1038	6	0.0300	9	0.0326	9
KF	-0.5054	2	-0.5632	1	-0.4609	2	-0.4639	2
NF	0.2400	5	0.5628	2	0.4119	3	0.6755	1

Appendix 112. Sensitivity of pesticide losses in PELMO as calculated from the transformed data for the four scenarios.

The transformation consisted in replacing parameter values by their rank
Betas are the coefficients of a normalised regression
The ranking is calculated on absolute betas

	OLW		OTW		OLH		OTH	
	Beta	Rank	Beta	Rank	Beta	Rank	Beta	Rank
WC_FC	-0.9913	1	-0.9812	1	-0.9711	1	-0.9749	1
WP	0.1412	2	0.1369	2	0.2084	2	0.2149	2
PDRA	-0.0023	12	0.0027	12	-0.0007	19	0.0217	3
CINTCP	-0.0082	3	-0.0054	5	-0.0028	14	-0.0080	7
AMXDR	0.0018	16	-0.0057	4	-0.0070	6	0.0093	5
ANETD	-0.0012	17	0.0026	14	-0.0115	3	0.0062	11
FEXT	0.0020	15	0.0068	3	0.0049	11	-0.0075	9
ASM	0.0064	5	0.0011	18	-0.0050	10	-0.0086	6
COVMAX	0.0044	8	-0.0028	11	-0.0018	16	0.0110	4
OC	-0.0055	7	-0.0043	6	0.0072	5	-0.0026	15
UPTK	-0.0042	9	-0.0043	7	0.0025	15	-0.0080	8
KF	-0.0056	6	0.0038	8	0.0059	7	-0.0035	13
BUD	-0.0076	4	-0.0029	10	0.0007	18	-0.0054	12
PH	0.0022	13	-0.0034	9	-0.0074	4	-0.0035	14
MEXP	0.0037	10	-0.0001	19	0.0052	9	0.0072	10
HENR	-0.0034	11	-0.0017	16	-0.0044	12	0.0025	16
NF	-0.0009	18	-0.0017	15	-0.0056	8	0.0010	19
DEGR	-0.0008	19	-0.0027	13	0.0035	13	0.0014	17
QTEN	0.0021	14	0.0015	17	-0.0008	17	0.0012	18

Appendix 113. Classification of PELMO parameters according to their influence on recharge as determined from the betas of a multiple linear regression on the ranked data from the Monte Carlo sampling runs

The ranking was performed on the absolute values of betas.
A positive (resp. negative) beta means that an increase in the value of the parameter will result in an increase (resp. decrease) in recharge

	OLW		OTW		OLH		OTH	
	Beta	Rank	Beta	Rank	Beta	Rank	Beta	Rank
DEGR	-0.6316	1	-0.4369	3	-0.5302	1	-0.4251	3
KF	-0.5054	2	-0.5632	1	-0.4609	2	-0.4639	2
NF	0.2400	5	0.5628	2	0.4119	3	0.6755	1
WC_FC	-0.2931	3	-0.2111	4	-0.3158	4	-0.1697	4
QTEN	0.2860	4	0.1523	5	0.2502	5	0.1458	5
ASM	0.1648	6	0.1007	7	0.1296	6	0.1027	6
BUD	-0.1028	7	-0.0811	8	-0.0661	7	-0.0420	8
MEXP	0.0667	8	0.1038	6	0.0300	9	0.0326	9
AMXDR	-0.0363	9	-0.0603	9	-0.0177	10	-0.0284	10
FEXT	0.0256	11	-0.0175	12	-0.0067	18	-0.0500	7
WP	0.0176	12	-0.0441	10	0.0094	15	0.0019	19
CINTCP	-0.0287	10	0.0076	16	-0.0106	14	-0.0152	12
ANETD	-0.0016	18	0.0010	19	-0.0370	8	-0.0085	14
UPTK	0.0128	13	0.0089	14	-0.0131	12	-0.0126	13
HENR	-0.0115	15	-0.0072	17	0.0048	19	0.0193	11
COVMAX	0.0127	14	-0.0078	15	0.0144	11	-0.0062	15
PH	0.0006	19	-0.0224	11	-0.0093	16	0.0056	17
OC	0.0067	16	-0.0156	13	0.0070	17	-0.0056	16
PDRA	-0.0060	17	0.0048	18	-0.0113	13	0.0033	18

Appendix 114. Classification of PELMO parameters according to their influence on pesticide losses as determined from the betas of a multiple linear regression on the ranked data from the Monte Carlo sampling runs

The ranking was performed on the absolute values of betas.
A positive (resp. negative) beta means that an increase in the value of the parameter will result in an increase (resp. decrease) in pesticide losses

	Recharge		Pesticide losses	
	Non-ranked	Ranked	Non-ranked	Ranked
OLW	0.996	0.997	0.649	0.947
OTW	0.997	0.997	0.448	0.916
OLH	0.991	0.993	0.497	0.925
OTH	0.988	0.993	0.251	0.944

Appendix 115. Comparison of the results from the multiple linear regressions (R^2 values) for raw and transformed data from PELMO for the four scenarios

The transformation consisted in the replacement of values by their rank.

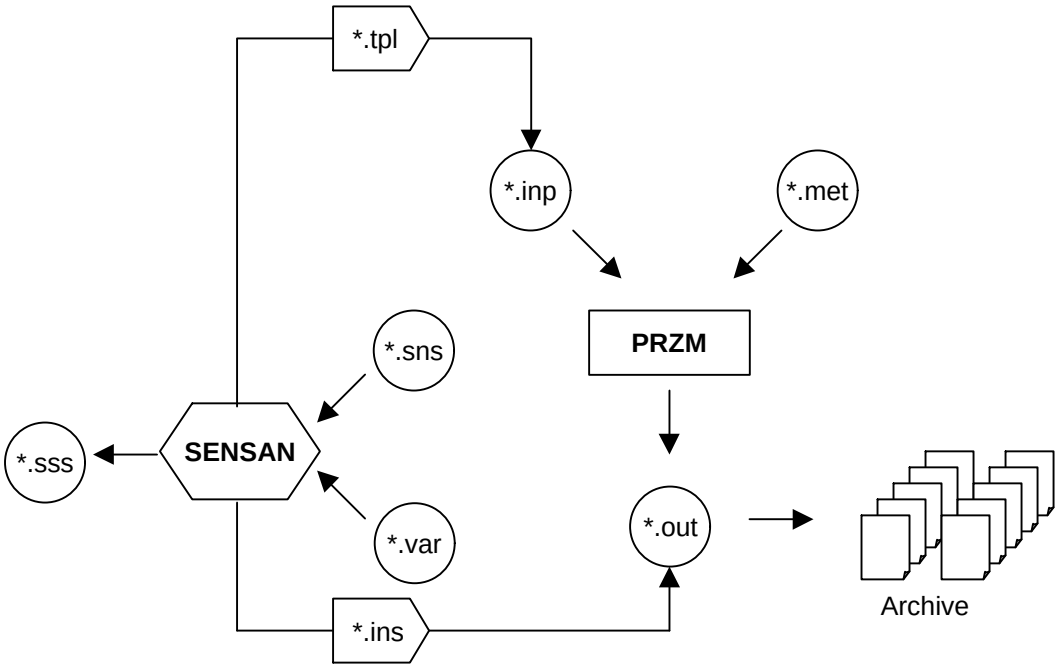
Sensitivity analysis of pesticide registration models

Appendices for PRZM

Appendix 116. Example of pesticide file (*.inp) for PRZM (*Pesticide L on Wick* scenario)

```
*** Record 1: Simulation title
Scenario ZLW for SENSIT
*** Record 2: Secondary title
File created by ID
*** Record 3: PFAC, SFAC, IPEIND, ANETD, INICRP, ISCOND
       1    0.45       0   15          1       3
*** Record 6: ERFLAG
       0
*** Record 8: NDC
       1
*** Record 9: ICNCN, CINTCP, AMXDR, COVMAX, ICNAH, CN1, CN2, CN3, WFMAX, HTMAX
       1    0.15   60      90          3  71  71  71    0.00   55.00
*** Record 10: NCPDS
      10
*** Record 11: EMD, EMM, IYREM, MAD, MAM, IYRMAT, HAD, HAM, IYRHAR, INCROP
  121001  240602  070702       1
  121002  240603  070703       1
  121003  240604  070704       1
  121004  240605  070705       1
  121005  240606  070706       1
  121006  240607  070707       1
  121007  240608  070808       1
  121008  240609  070809       1
  121009  240610  070810       1
  121010  240611  070811       1
*** Record 12: PTITLE
Chemical input data
*** Record 13: NAPS, NCHEM, FRMFLG, DKFLG2
       1       1       0       0
*** Record 15: PSTNAM
Pesticide L
*** Record 16: APD, APM, AIPYR, WINDAY, CAM, DEPI, TAPP, APPEFF, DRFT
  011101  0 2 0.00  2.00 1.00 0.00
*** Record 17: FILTRA, IPSCND, UPTKF
      0.       2    0.50
*** Record 18: PLVKRT, PLDKRT, FEXTRC
  0.0000  0.0893     0.1
*** Record 19: STITLE
Soil Series: Wick
*** Record 20: CORED, BDFLAG, THFLAG, KDFLAG, HSWZT, MOC, IRFLAG, ITFLAG, IDFLAG, BIOFLG
  100.00           0   0   2   0   0   0   2   1   0
*** Record 26: DAIR, HENRYK, ENPY
 4300.00 5e-7      20.00
*** New record 30b: NF
  0.9000
*** New record 31: ALBEDO, EMMISSIVITY and ZWIND
 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.96 2.0
*** New record 32: TEMP FOR BB
 08.0 08.0 08.0 08.0 08.0 08.0 08.0 08.0 08.0 08.0 08.0 08.0
*** New record 32: QTEN and TBASE
    2.20   20.00
*** New record 32b: FLAG ABS/REL, B-VALUE, REFMOIST
       1    0.70  0.2775
*** Record 33: NHORIZ
       5
*** Record 34: HORIZN, THKNS, BD, THETO, AD, DISP, ADL (ignore ADL)
*** Record 36: DWRATE, DSRATE, DGRATE
*** Record 37: DPN, THEFC, THEWP, OC, +++++ KD ++++++
*** New record 38: SPT, SAND, CLAY, THCOND, VHTCAP
       1  10.000   1.350  0.2775   0.000   0.000
          0.0893  0.0893  0.0000
           0.100  0.2775  0.1054   1.700   0.340
            8.00    0.00    0.00    0.00    0.00
       2  10.000   1.350  0.2775   0.000   0.000
          0.0893  0.0893  0.0000
           1.000  0.2775  0.1054   1.700   0.340
            8.00    0.00    0.00    0.00    0.00
       3  30.000   1.450  0.1913   0.000   0.000
          0.0504  0.0504  0.0000
           5.000  0.1913  0.0794   0.800   0.160
            8.00    0.00    0.00    0.00    0.00
       4  25.000   1.410  0.1469   0.000   0.000
```

```
         0.0265  0.0265  0.0000
          5.000  0.1469  0.0437   0.300   0.060
           8.00    0.00    0.00    0.00    0.00
      5  25.000   1.530  0.1923   0.000   0.000
         0.0211  0.0211  0.0000
          5.000  0.1923  0.0765   0.200   0.040
           8.00    0.00    0.00    0.00    0.00
*** Record 40: ILP, CFLAG
      0
*** Record 42: ITEM1, STEP1, LFREQ1, etc. + EXMFLG
    WATR    YEAR      10    PEST    YEAR      10    CONC    YEAR      10   0
*** Record 45: NPLOTS, STEP4
      0    DAY
```



Appendix 117. Flow chart explaining the combination of PRZM and SENSAN

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

Appendix 118. List of PRZM parameters included in the sensitivity analyses

	Initial value	Absolute values		Perc. of variation		Multiplication factor	
		Min	Max	Min	Max	Min	Max
ANET	15	5	25	-66.67	66.67	0.33	1.67
CINT	0.15	0.1	0.3	-33.33	100	0.67	2
AMXD	60	30	100	-50	66.67	0.5	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	100	0	2
PLDK	0.0893	0.04465	0.1786	-50	100	0.5	2
FEXT	0.1	0.05	0.15	-50	50	0.5	1.5
NF	0.9	0.72	1.08	-20	20	0.8	1.2
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	25	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	0.6	1.4
ASM	0.2775	0.197	0.34687	-29.01	25	0.71	1.25
BD1	1.35	1.215	1.485	-10	10	0.9	1.1
DEG1	0.0893	0.04465	0.1786	-50	100	0.5	2
FC1	0.2775	0.197	0.34687	-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	100	0.5	2
TINI	8	6	10	-25	25	0.75	1.25

Appendix 119. Variation attributed to PRZM input parameters for the one-at-a-time sensitivity analysis *Pesticide L on Wick* scenario

	Initial value	Absolute values		Perc. of variation		Multiplication factor	
		Min	Max	Min	Max	Min	Max
ANET	15	5	25	-66.67	66.67	0.33	1.67
CINT	0.15	0.1	0.3	-33.33	100	0.67	2
AMXD	60	30	100	-50	66.67	0.5	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	100	0	2
PLDK	0.0298	0.0149	0.0596	-50	100	0.5	2
FEXT	0.1	0.05	0.15	-50	50	0.5	1.5
NF	0.9	0.72	1.08	-20	20	0.8	1.2
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	25	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	0.6	1.4
ASM	0.2775	0.197	0.34687	-29.01	25	0.71	1.25
BD1	1.35	1.215	1.485	-10	10	0.9	1.1
DEG1	0.0298	0.0149	0.0596	-50	100	0.5	2
FC1	0.2775	0.197	0.34687	-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	100	0.5	2
TINI	8	6	10	-25	25	0.75	1.25

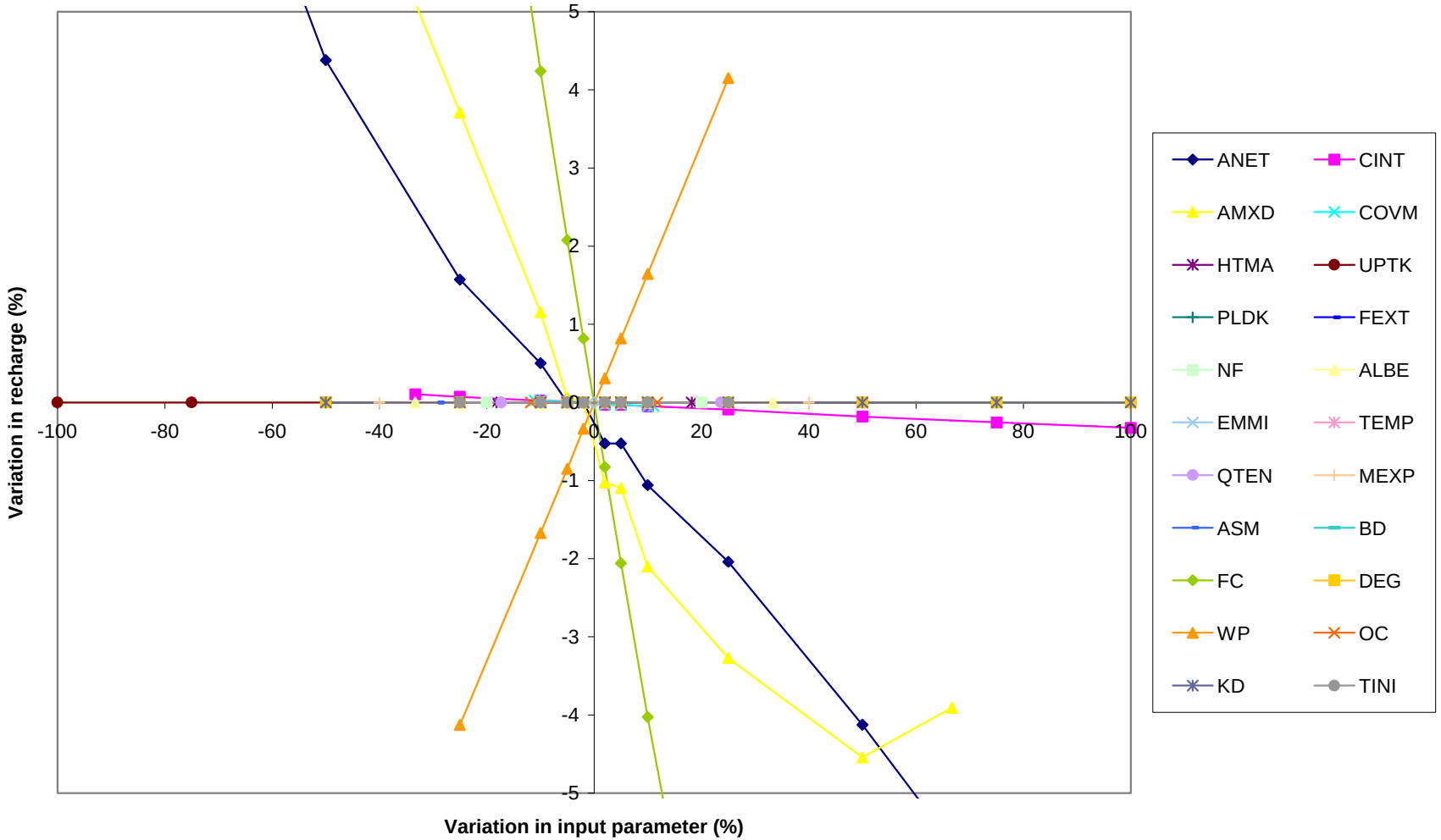
Appendix 120. Variation attributed to PRZM input parameters for the one-at-a-time sensitivity analysis *Pesticide L on Wick* scenario

	Initial value	Absolute values		Perc. of variation		Multiplication factor	
		Min	Max	Min	Max	Min	Max
ANET	15	5	25	-66.67	66.67	0.33	1.67
CINT	0.15	0.1	0.3	-33.33	100	0.67	2
AMXD	60	30	100	-50	66.67	0.5	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	100	0	2
PLDK	0.0893	0.04465	0.1786	-50	100	0.5	2
FEXT	0.1	0.05	0.15	-50	50	0.5	1.5
NF	0.9	0.72	1.08	-20	20	0.8	1.2
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	25	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	0.6	1.4
ASM	0.349	0.197	0.43625	-43.55	25	0.56	1.25
BD1	1.39	1.251	1.529	-10	10	0.9	1.1
DEG1	0.0893	0.04465	0.1786	-50	100	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	100	0.5	2
TINI	8	6	10	-25	25	0.75	1.25

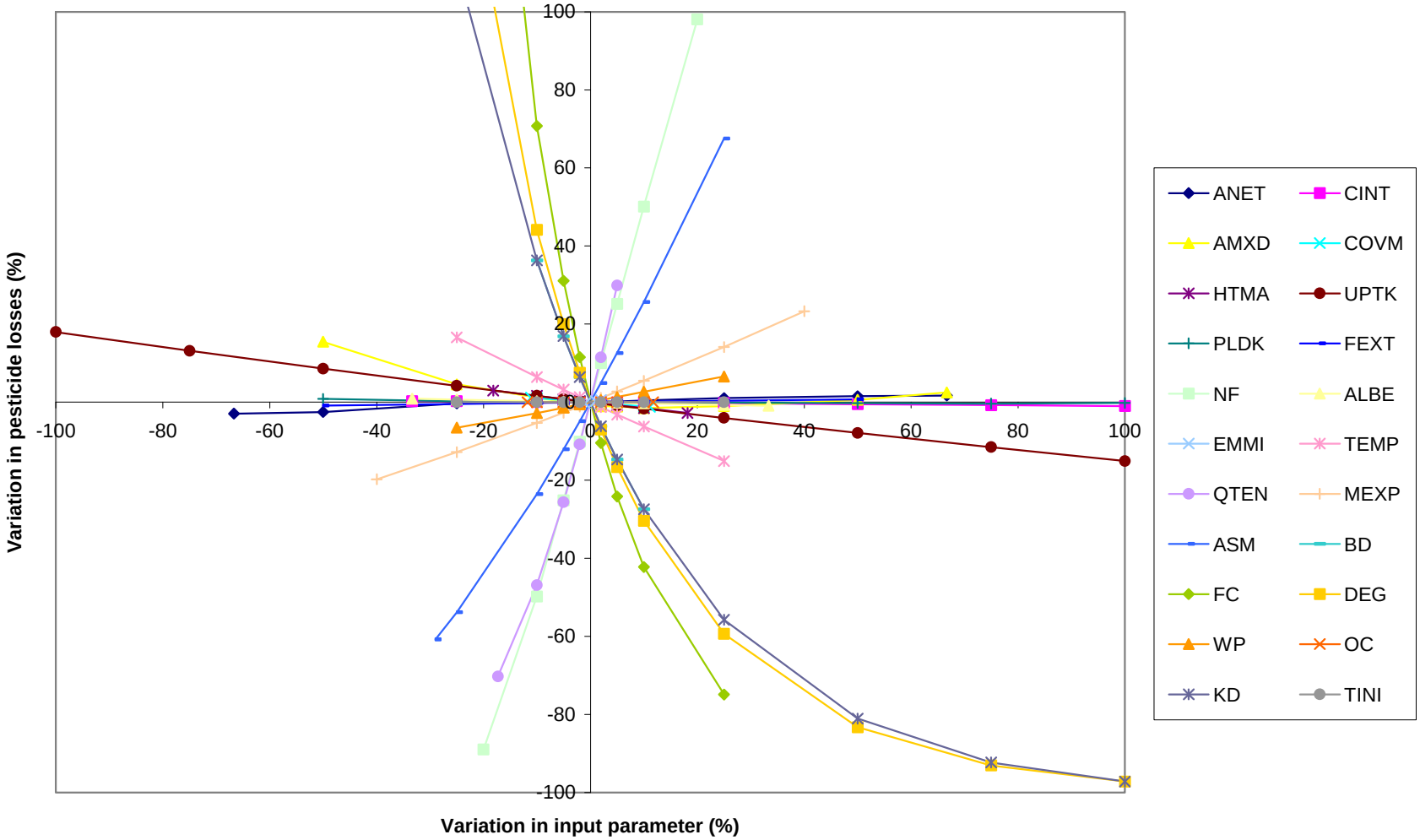
Appendix 121. Variation attributed to PRZM input parameters for the one-at-a-time sensitivity analysis *Pesticide T on Hodnet* scenario

	Initial value	Absolute values		Perc. of variation		Multiplication factor	
		Min	Max	Min	Max	Min	Max
ANET	15	5	25	-66.67	66.67	0.33	1.67
CINT	0.15	0.1	0.3	-33.33	100	0.67	2
AMXD	60	30	100	-50	66.67	0.5	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	100	0	2
PLDK	0.0298	0.0149	0.0596	-50	100	0.5	2
FEXT	0.1	0.05	0.15	-50	50	0.5	1.5
NF	0.9	0.72	1.08	-20	20	0.8	1.2
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	25	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	0.6	1.4
ASM	0.349	0.197	0.43625	-43.55	25	0.56	1.25
BD1	1.39	1.251	1.529	-10	10	0.9	1.1
DEG1	0.0298	0.0149	0.0596	-50	100	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	1.15	0.575	2.3	-50	100	0.5	2
TINI	8	6	10	-25	25	0.75	1.25

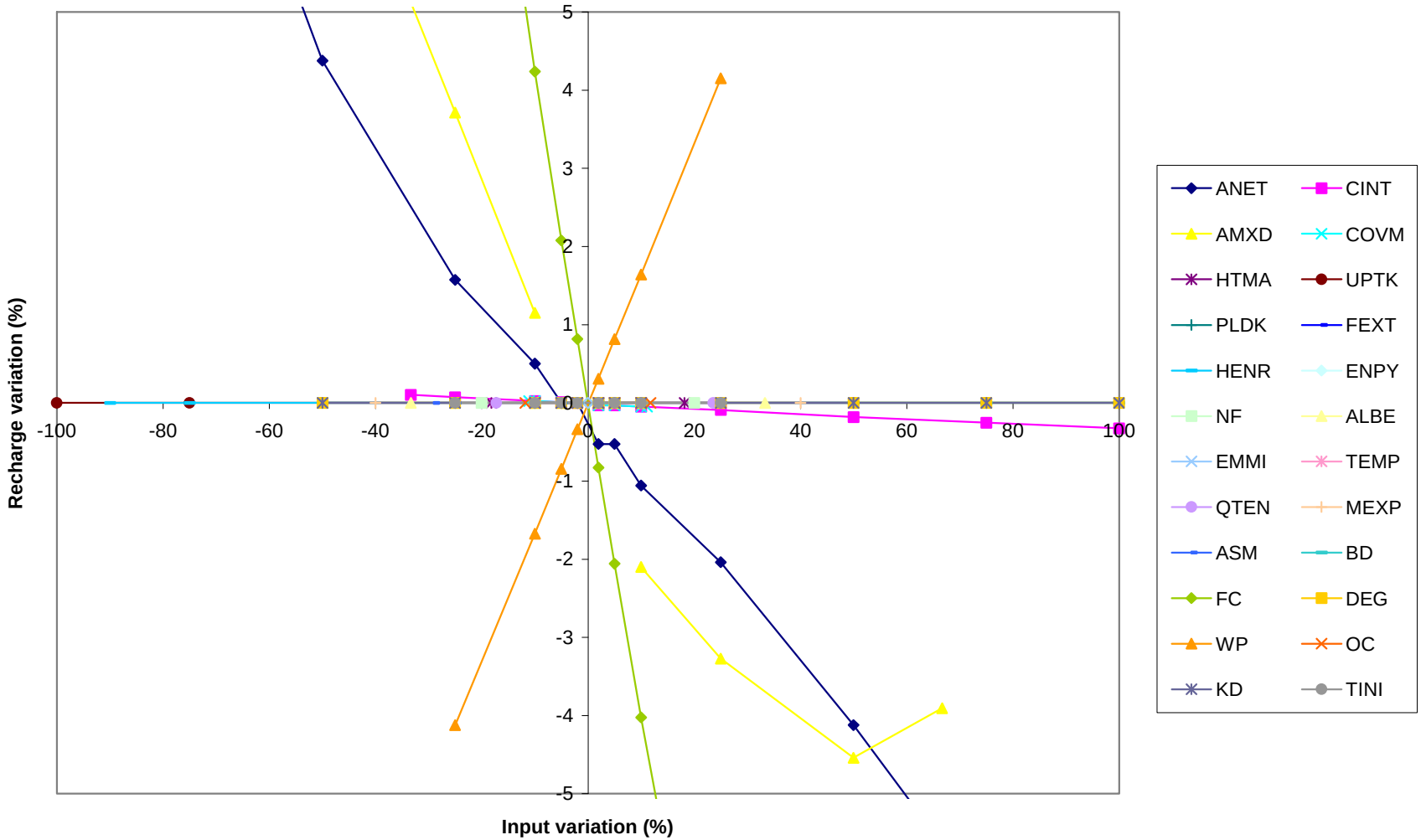
Appendix 122. Variation attributed to PRZM input parameters for the one-at-a-time sensitivity analysis *Pesticide T on Hodnet* scenario



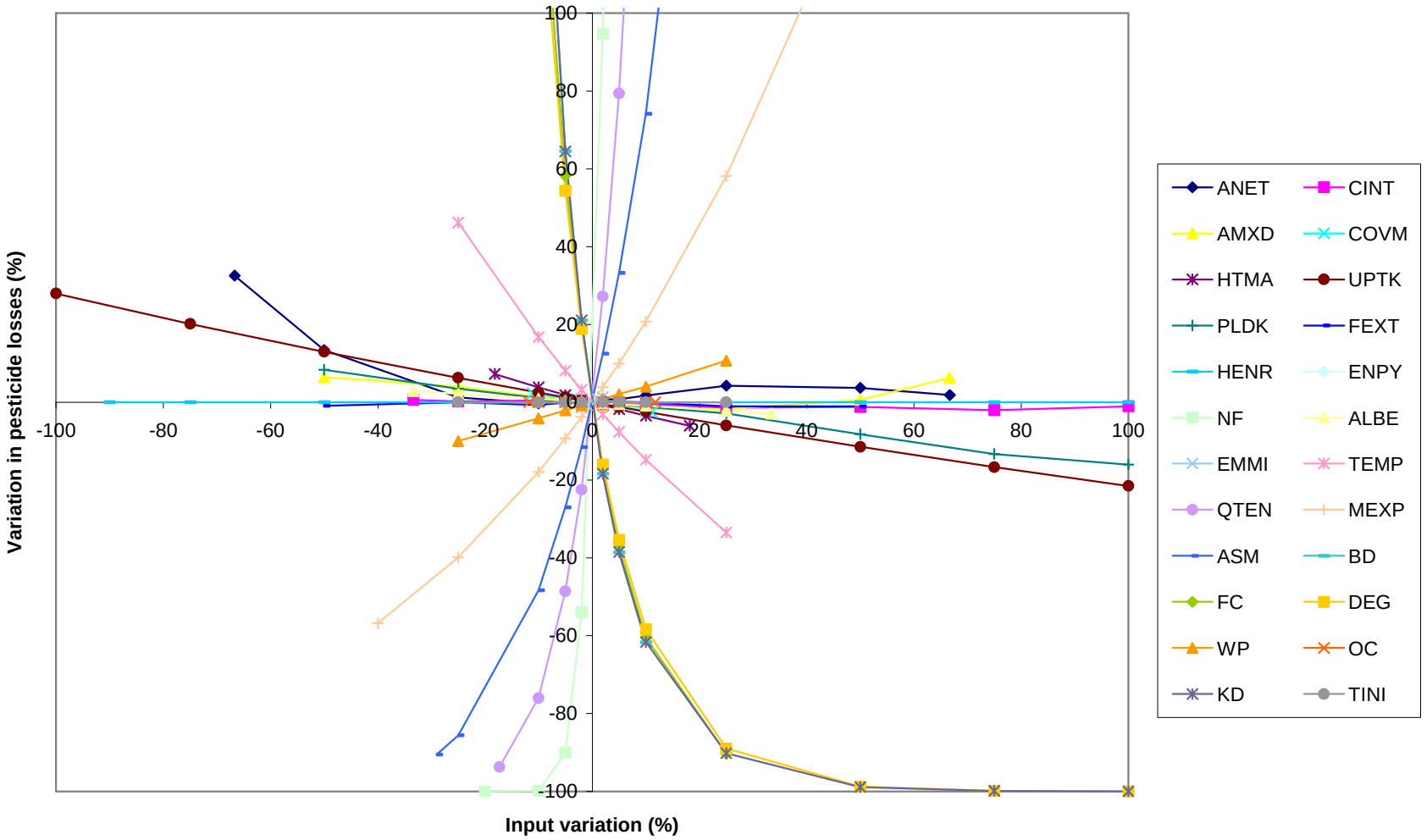
Appendix 123. Influence of the variation of input parameters on recharge results predicted by PRZM – *Pesticide L on Wick* scenario
The closer the curve to the Y-axis, the more influence the parameter has.



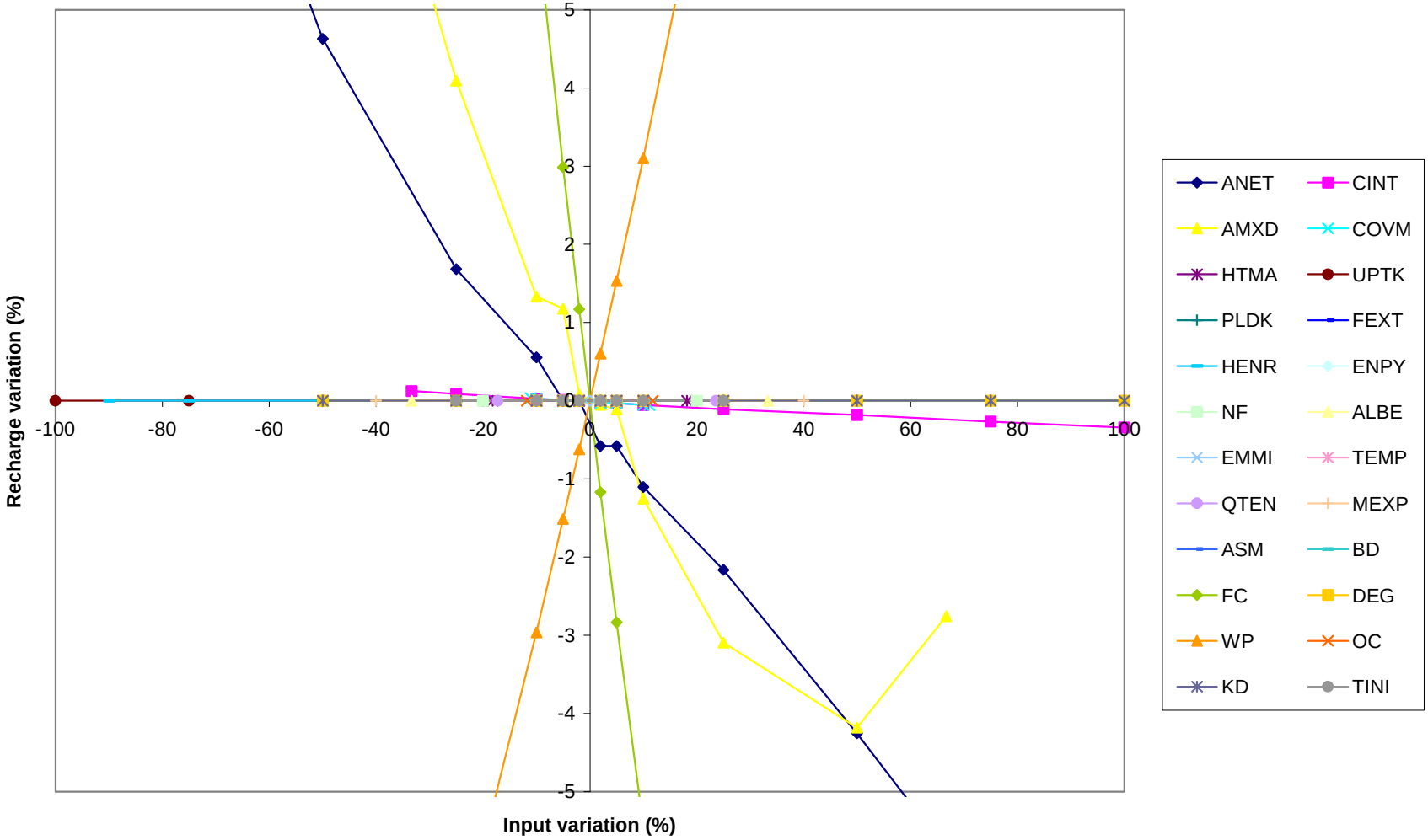
Appendix 124. Influence of the variation of input parameters on pesticide losses results predicted by PRZM – *Pesticide L on Wick* scenario
The closer the curve to the Y-axis, the more influence the parameter has.



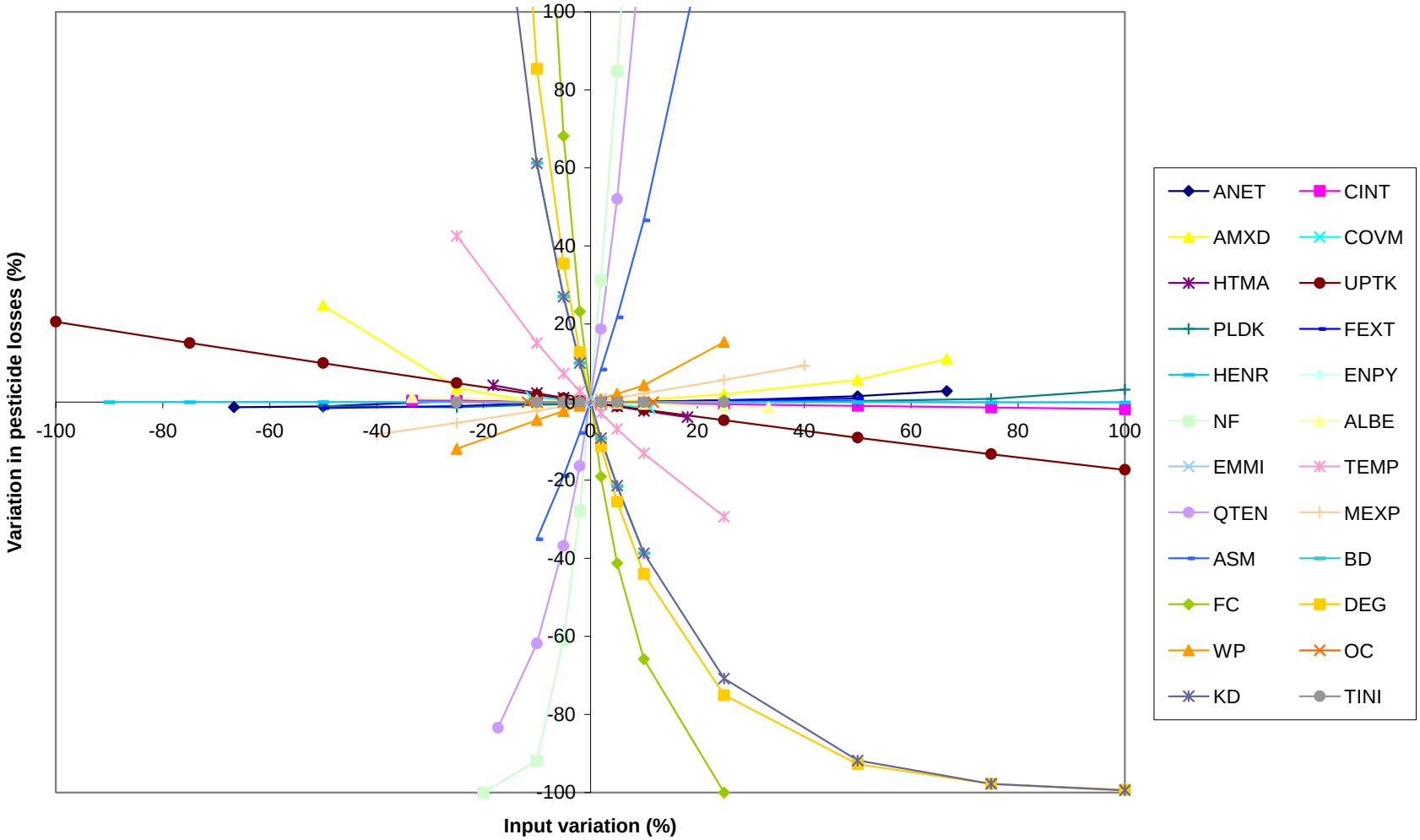
Appendix 125. Influence of the variation of input parameters on recharge results predicted by PRZM – *Pesticide T on Wick* scenario
The closer the curve to the Y-axis, the more influence the parameter has.



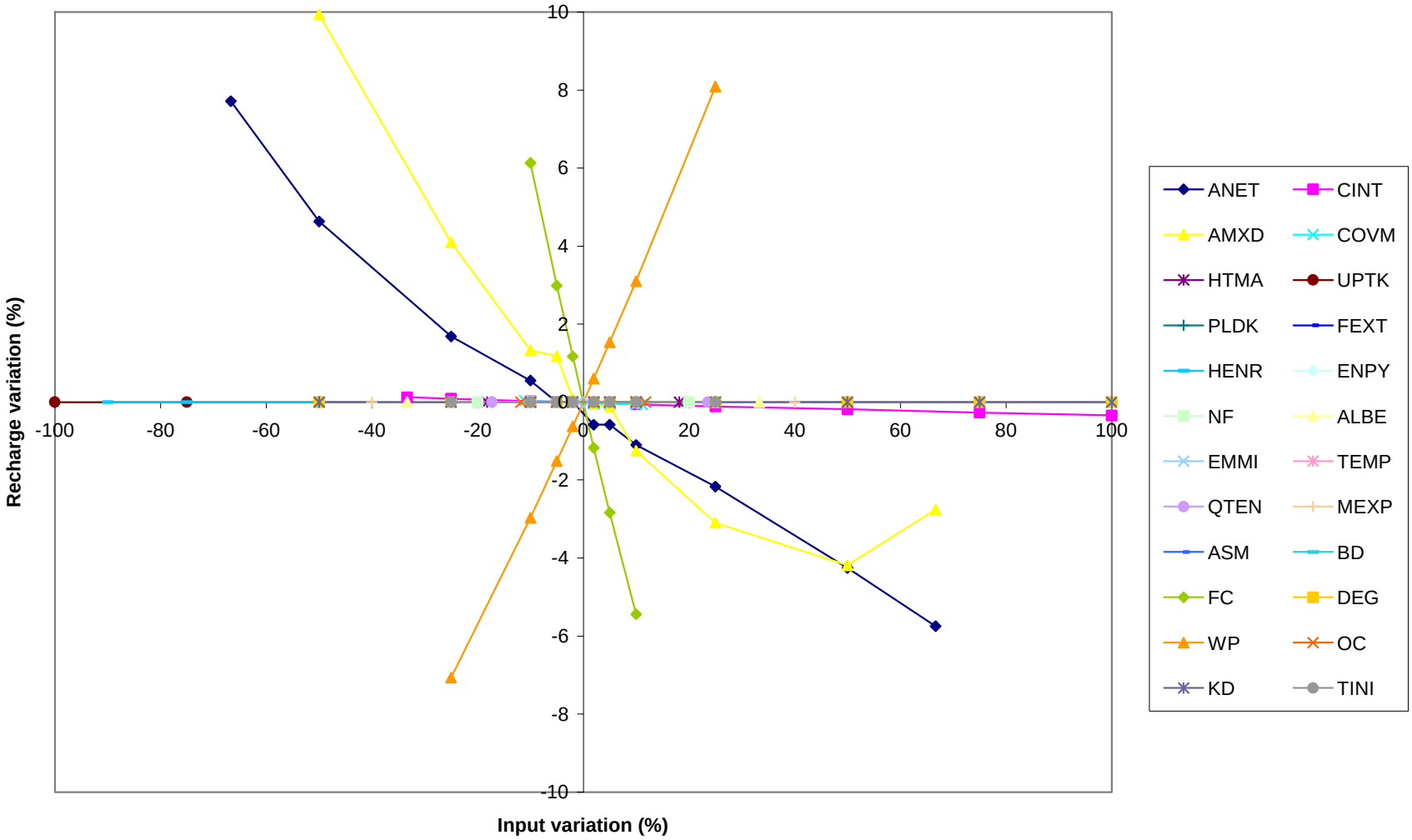
Appendix 126. Influence of the variation of input parameters on pesticide losses results predicted by PRZM – *Pesticide T on Wick* scenario
The closer the curve to the Y-axis, the more influence the parameter has.



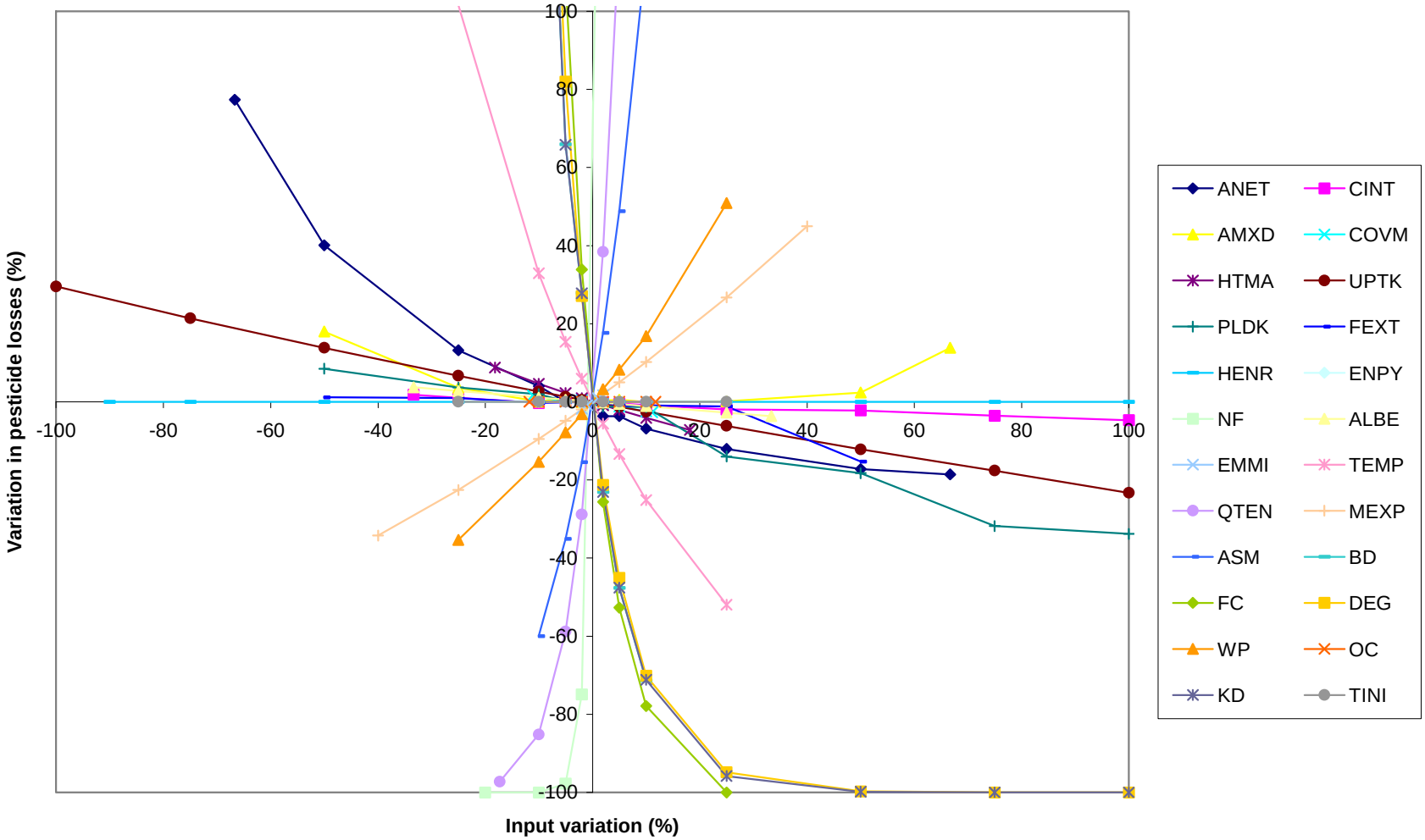
Appendix 127. Influence of the variation of input parameters on recharge results predicted by PRZM – *Pesticide L on Hodnet* scenario
The closer the curve to the Y-axis, the more influence the parameter has.



Appendix 128. Influence of the variation of input parameters on pesticide losses results predicted by PRZM – *Pesticide L on Hodnet* scenario
The closer the curve to the Y-axis, the more influence the parameter has.



Appendix 129. Influence of the variation of input parameters on recharge results predicted by PRZM – *Pesticide T on Hodnet* scenario
The closer the curve to the Y-axis, the more influence the parameter has.



Appendix 130. Influence of the variation of input parameters on pesticide losses results predicted by PRZM – *Pesticide T on Hodnet* scenario
The closer the curve to the Y-axis, the more influence the parameter has.

	Parameter	Description	MAROV	Influence
1	FC	Field capacity	0.457	-
2	ANET	Minimum depth for extraction of evaporation	0.262	-
3	AMXD	Maximum rooting depth	0.210	-
4	WP	Wilting point	0.169	+
5	CINT	Maximum interception storage	0.015	-
6	COVM	Maximum areal coverage of canopy	0.015	-
7	HTMA	Maximum canopy height	0	
8	UPTK	Plant uptake factor	0	
9	PLDK	Pesticide decay rate on canopy	0	
10	FEXT	Foliar extraction coefficient	0	
11	NF	Freundlich exponent	0	
12	A	Albedo	0	
13	EM	Emmissivity	0	
14	T	Average monthly temp at BB	0	
15	QTEN	qten	0	
16	MEXP	Moisture exponent for degradation	0	
17	ASM	Reference moisture for degradation	0	
18	BD	Bulk density	0	
19	DEG	Degradation rate	0	
20	OC	Organic carbon content	0	
21	KD	Freundlich coefficient	0	
22	TINI	Initial temp of the horizon	0	

Appendix 131. Classification of PRZM input parameters according to their influence on recharge results for the *Pesticide L on Wick* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in recharge.

	Parameter	Description	MAROV	Influence
1	FC	Field Capacity	11.4	-
2	DEG	Degradation rate	11.1	-
3	QTEN	qten	7.4	+
4	KD	Freundlich coefficient	6.1	-
5	NF	Freundlich exponent	5.1	+
6	BD	Bulk density	3.6	-
7	ASM	Reference moisture for degradation	2.7	+
8	T	Average monthly temp at BB	0.663	-
9	MEXP	Moisture exponent for degradation	0.583	+
10	AMXD	Maximum rooting depth	0.533	+/-
11	EM	Emmissivity	0.284	+
12	WP	Wilting point	0.282	+
13	UPTK	Plant uptake factor	0.180	-
14	HTMA	Maximum canopy height	0.164	-
15	COVM	Maximum areal coverage of canopy	0.114	-
16	ANET	Minimum depth for extraction of evaporation	0.099	+
17	A	Albedo	0.035	-
18	FEXT	Foliar extraction coefficient	0.019	+
19	PLDK	Pesticide decay rate on canopy	0.017	-
20	CINT	Maximum interception storage	0.013	+/-
21	OC	Organic carbon content	0	
22	TINI	Initial temp of the horizon	0	

Appendix 132. Classification of PRZM input parameters according to their influence on pesticide losses for the *Pesticide L on Wick* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in pesticide losses

	Parameter	Description	MAROV	Influence
1	FC	Field capacity	0.457	-
2	ANET	Minimum depth for extraction of evaporation	0.262	-
3	AMXD	Maximum rooting depth	0.210	-
4	WP	Wilting point	0.169	+
5	CINT	Maximum interception storage	0.015	-
6	COVM	Maximum areal coverage of canopy	0.015	-
7	HTMA	Maximum canopy height	0	
8	UPTK	Plant uptake factor	0	
9	PLDK	Pesticide decay rate on canopy	0	
10	FEXT	Foliar extraction coefficient	0	
11	NF	Freundlich exponent	0	
12	A	Albedo	0	
13	EM	Emmissivity	0	
14	T	Average monthly temp at BB	0	
15	QTEN	qten	0	
16	MEXP	Moisture exponent for degradation	0	
17	ASM	Reference moisture for degradation	0	
18	BD	Bulk density	0	
19	DEG	Degradation rate	0	
20	OC	Organic carbon content	0	
21	KD	Freundlich coefficient	0	
22	TINI	Initial temp of the horizon	0	

Appendix 133. Classification of PRZM input parameters according to their influence on recharge results for the *Pesticide T on Wick* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in recharge

	Parameter	Description	MAROV	Influence
1	KD	Freundlich coefficient	204.6	-
2	NF	Freundlich exponent	182.1	+
3	DEG	Degradation rate	138.9	-
4	FC	Field Capacity	43.5	-
5	QTEN	qten	35.6	+
6	BD	Bulk density	17.6	-
7	ASM	Reference moisture for degradation	9.9	+
8	MEXP	Moisture exponent for degradation	2.6	+
9	T	Average monthly temp at BB	1.8	-
10	EM	Emmissivity	0.753	+
11	AMXD	Maximum rooting depth	0.649	+/-
12	ANET	Minimum depth for extraction of evaporation	0.488	+/-
13	WP	Wilting point	0.430	+
14	HTMA	Maximum canopy height	0.401	-
15	UPTK	Plant uptake factor	0.279	-
16	COVM	Maximum areal coverage of canopy	0.230	-
17	PLDK	Pesticide decay rate on canopy	0.177	+/-
18	A	Albedo	0.102	-
19	FEXT	Foliar extraction coefficient	0.072	+/-
20	CINT	Maximum interception storage	0.056	-
21	OC	Organic carbon content	0	
22	TINI	Initial temp of the horizon	0	

Appendix 134. Classification of PRZM input parameters according to their influence on pesticide losses for the *Pesticide T on Wick* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in pesticide losses

	Parameter	Description	MAROV	Influence
1	FC	Field capacity	0.613	-
2	WP	Wilting point	0.324	-
3	ANET	Minimum depth for extraction of evaporation	0.290	-
4	AMXD	Maximum rooting depth	0.235	+
5	CINT	Maximum interception storage	0.015	-
6	COVM	Maximum areal coverage of canopy	0.015	-
7	HTMA	Maximum canopy height	0	
8	UPTK	Plant uptake factor	0	
9	PLDK	Pesticide decay rate on canopy	0	
10	FEXT	Foliar extraction coefficient	0	
11	NF	Freundlich exponent	0	
12	A	Albedo	0	
13	EM	Emmissivity	0	
14	T	Average monthly temp at BB	0	
15	QTEN	qten	0	
16	MEXP	Moisture exponent for degradation	0	
17	ASM	Reference moisture for degradation	0	
18	BD	Bulk density	0	
19	DEG	Degradation rate	0	
20	OC	Organic carbon content	0	
21	KD	Freundlich coefficient	0	
22	TINI	Initial temp of the horizon	0	

Appendix 135. Classification of PRZM input parameters according to their influence on recharge results for the *Pesticide L on Hodnet* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in recharge

	Parameter	Description	MAROV	Influence
1	DEG	Degradation rate	59.7	-
2	NF	Freundlich exponent	21.2	+
3	QTEN	qten	18.9	+
4	FC	Field Capacity	18.6	-
5	KD	Freundlich coefficient	16.9	-
6	BD	Bulk density	6.1	-
7	ASM	Reference moisture for degradation	5.6	+
8	T	Average monthly temp at BB	1.7	-
9	WP	Wilting point	0.618	+
10	AMXD	Maximum rooting depth	0.496	+/-
11	EM	Emmissivity	0.393	+
12	HTMA	Maximum canopy height	0.237	-
13	MEXP	Moisture exponent for degradation	0.234	+
14	UPTK	Plant uptake factor	0.206	-
15	COVM	Maximum areal coverage of canopy	0.137	-
16	PLDK	Pesticide decay rate on canopy	0.114	+/-
17	A	Albedo	0.050	-
18	ANET	Minimum depth for extraction of evaporation	0.043	+/-
19	FEXT	Foliar extraction coefficient	0.039	+
20	CINT	Maximum interception storage	0.028	-
21	OC	Organic carbon content	0	
22	TINI	Initial temp of the horizon	0	

Appendix 136. Classification of PRZM input parameters according to their influence on pesticide losses for the *Pesticide L on Hodnet* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in pesticide losses

	Parameter	Description	MAROV	Influence
1	FC	Field capacity	0.613	-
2	WP	Wilting point	0.324	-
3	ANET	Minimum depth for extraction of evaporation	0.290	-
4	AMXD	Maximum rooting depth	0.235	+
5	CINT	Maximum interception storage	0.015	-
6	COVM	Maximum areal coverage of canopy	0.015	-
7	HTMA	Maximum canopy height	0	
8	UPTK	Plant uptake factor	0	
9	PLDK	Pesticide decay rate on canopy	0	
10	FEXT	Foliar extraction coefficient	0	
11	NF	Freundlich exponent	0	
12	A	Albedo	0	
13	EM	Emmissivity	0	
14	T	Average monthly temp at BB	0	
15	QTEN	qten	0	
16	MEXP	Moisture exponent for degradation	0	
17	ASM	Reference moisture for degradation	0	
18	BD	Bulk density	0	
19	DEG	Degradation rate	0	
20	OC	Organic carbon content	0	
21	KD	Freundlich coefficient	0	
22	TINI	Initial temp of the horizon	0	

Appendix 137. Classification of PRZM input parameters according to their influence on recharge results for the *Pesticide T on Hodnet* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in recharge

	Parameter	Description	MAROV	Influence
1	NF	Freundlich exponent	3476.9	+
2	DEG	Degradation rate	1061.9	-
3	KD	Freundlich coefficient	1061.1	-
4	QTEN	qten	91.4	+
5	FC	Field Capacity	33.8	-
6	BD	Bulk density	21.9	-
7	ASM	Reference moisture for degradation	18.8	+
8	T	Average monthly temp at BB	4.1	-
9	WP	Wilting point	2.0	+
10	ANET	Minimum depth for extraction of evaporation	1.8	-
11	MEXP	Moisture exponent for degradation	1.1	+
12	EM	Emmissivity	0.929	+
13	PLDK	Pesticide decay rate on canopy	0.613	-
14	HTMA	Maximum canopy height	0.485	-
15	AMXD	Maximum rooting depth	0.359	+/-
16	FEXT	Foliar extraction coefficient	0.306	+/-
17	UPTK	Plant uptake factor	0.295	-
18	COVM	Maximum areal coverage of canopy	0.266	-
19	A	Albedo	0.126	-
20	CINT	Maximum interception storage	0.088	+/-
21	OC	Organic carbon content	0	
22	TINI	Initial temp of the horizon	0	

Appendix 138. Classification of PRZM input parameters according to their influence on pesticide losses for the *Pesticide T on Hodnet* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in pesticide losses

		Wick		Hodnet	
		Pesticide L	Pesticide T	Pesticide L	Pesticide T
ANET	Minimum depth for extraction of evaporation	0.262	0.262	0.290	0.290
CINT	Maximum interception storage	0.015	0.015	0.015	0.015
AMXD	Maximum rooting depth	0.210	0.210	0.235	0.235
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
FC	Field Capacity	0.457	0.457	0.613	0.613
DEG	Degradation rate	0	0	0	0
WP	Wilting point	0.169	0.169	0.324	0.324
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

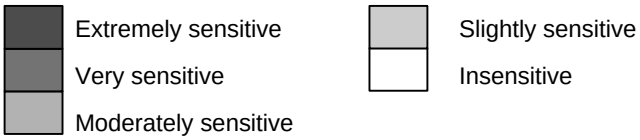
Appendix 139. Sensitivity indices (MAROV values) of PRZM parameters with regard to recharge for the four scenarios

		Wick		Hodnet		
		Pesticide L	Pesticide T	Pesticide L	Pesticide T	Influence
FC	Field Capacity	0.457	0.457	0.613	0.613	-
ANET	Minimum depth for extraction of evaporation	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	

Appendix 140. Classification of PRZM parameters according to their influence on recharge (values presented are MAROV)

A positive (resp. negative) influence means that an increase in the value of the parameter will result in an increase (resp. decrease) of recharge

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



		Wick		Hodnet	
		Pesticide L	Pesticide T	Pesticide L	Pesticide T
FC	Field Capacity	1	1	1	1
ANET	Minimum depth for extraction of evaporation	2	2	3	3
WP	Wilting point	4	4	2	2
AMXD	Maximum rooting depth	3	3	4	4
CINT	Maximum interception storage	5	5	5	5
COVM	Maximum areal coverage of canopy	5	5	5	5
HTMA	Maximum canopy height	-	-	-	-
UPTK	Plant uptake factor	-	-	-	-
PLDK	Pesticide decay rate on canopy	-	-	-	-
FEXT	Foliar extraction coefficient	-	-	-	-
NF	Freundlich exponent	-	-	-	-
A	Albedo	-	-	-	-
EM	Emmissivity	-	-	-	-
T	Average monthly temp at BB	-	-	-	-
QTEN	qten	-	-	-	-
MEXP	Moisture exponent for degradation	-	-	-	-
ASM	Reference moisture for degradation	-	-	-	-
BD	Bulk density	-	-	-	-
DEG	Degradation rate	-	-	-	-
OC	Organic carbon content	-	-	-	-
KD	Freundlich coefficient	-	-	-	-
TINI	Initial temp of the horizon	-	-	-	-

Appendix 141. Ranking of PRZM input parameters as a function of their influence on recharge results for the four scenarios

Parameters with the lowest ranking have the largest influence on recharge and vice versa

		Wick		Hodnet	
		Pesticide L	Pesticide T	Pesticide L	Pesticide T
ANET	Minimum depth for extraction of evaporation	0.099	0.488	0.043	1.8
CINT	Maximum interception storage	0.013	0.056	0.028	0.088
AMXD	Maximum rooting depth	0.533	0.649	0.496	0.359
COVM	Maximum areal coverage of canopy	0.114	0.230	0.137	0.266
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
FEXT	Foliar extraction coefficient	0.019	0.072	0.039	0.306
NF	Freundlich exponent	5.1	182.1	21.2	3476.9
A	Albedo	0.035	0.102	0.050	0.126
EM	Emmissivity	0.284	0.753	0.393	0.929
T	Average monthly temp at BB	0.663	1.8	1.7	4.1
QTEN	qten	7.4	35.6	18.9	91.4
MEXP	Moisture exponent for degradation	0.583	2.6	0.234	1.1
ASM	Reference moisture for degradation	2.7	9.9	5.6	18.8
BD	Bulk density	3.6	17.6	6.1	21.9
FC	Field Capacity	11.4	43.5	18.6	33.8
DEG	Degradation rate	11.1	138.9	59.7	1061.9
WP	Wilting point	0.282	0.430	0.618	2.0
OC	Organic carbon content	0	0	0	0
KD	Freundlich coefficient	6.1	204.6	16.9	1061.1
TINI	Initial temp of the horizon	0	0	0	0

Appendix 142. Sensitivity indices (MAROV values) of PRZM parameters with regard to total pesticide losses for the four scenarios

		Wick		Hodnet		
		Pesticide L	Pesticide T	Pesticide L	Pesticide T	Influence
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	-
QTEN	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	Minimum depth for extraction of evaporation	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	

Appendix 143. Classification of PRZM parameters according to their influence on pesticide losses (values presented are MAROV)

A positive (resp. negative) influence means that an increase in the value of the parameter will result in an increase (resp. decrease) of recharge

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

Extremely sensitive

Very sensitive

Moderately sensitive

Slightly sensitive

Insensitive

		Wick		Hodnet	
		Pesticide L	Pesticide T	Pesticide L	Pesticide T
NF	Freundlich exponent	5	2	2	1
KD	Freundlich coefficient	4	1	5	3
DEG	Degradation rate	2	3	1	2
QTEN	qten	3	5	3	4
FC	Field Capacity	1	4	4	5
BD	Bulk density	6	6	6	6
ASM	Reference moisture for degradation	7	7	7	7
T	Average monthly temp at BB	8	9	8	8
MEXP	Moisture exponent for degradation	9	8	13	11
WP	Wilting point	12	13	9	9
ANET	Minimum depth for extraction of evaporation	16	12	18	10
EM	Emmissivity	11	10	11	12
AMXD	Maximum rooting depth	10	11	10	15
HTMA	Maximum canopy height	14	14	12	14
UPTK	Plant uptake factor	13	15	14	17
PLDK	Pesticide decay rate on canopy	19	17	16	13
COVM	Maximum areal coverage of canopy	15	16	15	18
FEXT	Foliar extraction coefficient	18	19	19	16
A	Albedo	17	18	17	19
CINT	Maximum interception storage	20	20	20	20
OC	Organic carbon content	-	-	-	-
TINI	Initial temp of the horizon	-	-	-	-

Appendix 144. Ranking of PRZM input parameters as a function of their influence on losses results for the four scenarios

Parameter ZLW	Description	Distribution	Mean	Variance	Min	Max
ANET	Minimum depth for extraction of evaporation	Normal	15	2.603E+01	5	25
CINT	Maximum interception storage	Log-normal	0.15	8.9014E-04	0.1	0.3
AMXD	Maximum rooting depth	Normal	60	3.189E+02	30	100
COVM	Maximum areal coverage of canopy	Normal	90	2.603E+01	80	100
HTMA	Maximum canopy height	Normal	55	2.603E+01	45	65
UPTK	Plant uptake factor	Normal	0.5	6.508E-02	0	1
PLDK	Pesticide decay rate on canopy	Log-normal	0.0893	8.9686E-04	0.04465	0.1786
FEXT	Foliar extraction coefficient	Normal	0.1	6.508E-04	0.05	0.15
HENR	Henry's constant	Log-normal	5.00E-07	3.6218E-13	5.0E-9	5.0E-8
ENPY	Enthalpy of vaporisation	Normal	20	6.508E+00	15	25
NF	Freundlich exponent	Normal	0.9	8.434E-03	0.72	1.08
A	Albedo	Normal	0.18	9.185E-04	0.1206	0.2394
EM	Emmissivity	Normal	0.96	1.041E-04	0.94	0.98
T	Average monthly temp at BB	Normal	8	1.041E+00	6	10
QTEN	Factor of decrease of degradation when Delta T =10C	Normal	2.2	5.271E-02	1.82	2.72
MEXP	Moisture exponent for degradation	Normal	0.7	2.041E-02	0.42	0.98
ASM	Reference moisture for degradation	Normal	0.2775	1.462E-03	0.197	0.346875
BD	Bulk density	Normal	1.35	4.744E-03	1.215	1.485
FC	Field Capacity	Normal	0.2775	1.462E-03	0.197	0.346875
DEG	Degradation rate	Log-normal	0.0893	8.9686E-04	0.04465	0.1786
WP	Wilting point	Normal	0.1054	1.807E-04	0.07905	0.13175
OC	Organic carbon content	Normal	1.7	1.041E-02	1.5	1.9
KD	Freundlich coefficient	Log-normal	0.34	1.300E-02	0.17	0.68
TINI	Initial temp of the horizon	Normal	8	1.041E+00	6	10

Appendix 145. Parameterisation of probability distribution functions for PRZM parameters *(Pesticide L on Wick scenario)*

Parameter ZTW	Description	Distribution	Mean	Variance	Min	Max
ANET	Minimum depth for extraction of evaporation	Normal	15	2.603E+01	5	25
CINT	Maximum interception storage	Log-normal	0.15	8.901E-04	0.1	0.3
AMXD	Maximum rooting depth	Normal	60	3.189E+02	30	100
COVM	Maximum areal coverage of canopy	Normal	90	2.603E+01	80	100
HTMA	Maximum canopy height	Normal	55	2.603E+01	45	65
UPTK	Plant uptake factor	Normal	0.5	6.508E-02	0	1
PLDK	Pesticide decay rate on canopy	Log-normal	0.0298	9.987E-05	0.0149	0.0596
FEXT	Foliar extraction coefficient	Normal	0.1	6.508E-04	0.05	0.15
HENR	Henry's constant	Log-normal	-	-	-	-
ENPY	Enthalpy of vaporisation	Normal	20	6.508E+00	15	25
NF	Freundlich exponent	Normal	0.9	8.434E-03	0.72	1.08
A	Albedo	Normal	0.18	9.185E-04	0.1206	0.2394
EM	Emmissivity	Normal	0.96	1.041E-04	0.94	0.98
T	Average monthly temp at BB	Normal	8	1.041E+00	6	10
QTEN	Factor of decrease of degradation when Delta T =10C	Normal	2.2	5.271E-02	1.82	2.72
MEXP	Moisture exponent for degradation	Normal	0.7	2.041E-02	0.42	0.98
ASM	Reference moisture for degradation	Normal	0.2775	1.462E-03	0.197	0.346875
BD	Bulk density	Normal	1.35	4.744E-03	1.215	1.485
FC	Field Capacity	Normal	0.2775	1.462E-03	0.197	0.346875
DEG	Degradation rate	Log-normal	0.0298	9.987E-05	0.0149	0.0596
WP	Wilting point	Normal	0.1054	1.807E-04	0.07905	0.13175
OC	Organic carbon content	Normal	1.7	1.041E-02	1.5	1.9
KD	Freundlich coefficient	Log-normal	1.7	3.250E-01	0.85	3.4
TINI	Initial temp of the horizon	Normal	8	1.041E+00	6	10

Appendix 146. Parameterisation of probability distribution functions for PRZM parameters *(Pesticide T on Wick scenario)*

Parameter ZLH	Description	Distribution	Mean	Variance	Min	Max
ANET	Minimum depth for extraction of evaporation	Normal	15	2.603E+01	5	25
CINT	Maximum interception storage	Log-normal	0.15	8.901E-04	0.1	0.3
AMXD	Maximum rooting depth	Normal	60	3.189E+02	30	100
COVM	Maximum areal coverage of canopy	Normal	90	2.603E+01	80	100
HTMA	Maximum canopy height	Normal	55	2.603E+01	45	65
UPTK	Plant uptake factor	Normal	0.5	6.508E-02	0	1
PLDK	Pesticide decay rate on canopy	Log-normal	0.0893	8.9686E-04	0.04465	0.1786
FEXT	Foliar extraction coefficient	Normal	0.1	6.508E-04	0.05	0.15
HENR	Henry's constant	Log-normal	5E-07	3.622E-13	5E-08	5E-06
ENPY	Enthalpy of vaporisation	Normal	20	6.508E+00	15	25
NF	Freundlich exponent	Normal	0.9	8.434E-03	0.72	1.08
A	Albedo	Normal	0.18	9.185E-04	0.1206	0.2394
EM	Emmissivity	Normal	0.96	1.041E-04	0.94	0.98
T	Average monthly temp at BB	Normal	8	1.041E+00	6	10
QTEN	Factor of decrease of degradation when Delta T =10C	Normal	2.2	5.271E-02	1.82	2.72
MEXP	Moisture exponent for degradation	Normal	0.7	2.041E-02	0.42	0.98
ASM	Reference moisture for degradation	Normal	0.349	1.006E-03	0.312	0.4363
BD	Bulk density	Normal	1.39	5.030E-03	1.251	1.529
FC	Field Capacity	Normal	0.349	1.006E-03	0.312	0.4363
DEG	Degradation rate	Log-normal	0.0893	8.969E-04	0.04465	0.1786
WP	Wilting point	Normal	0.168	4.592E-04	0.126	0.21
OC	Organic carbon content	Normal	1.15	4.758E-03	1.0148	1.2852
KD	Freundlich coefficient	Log-normal	0.23	5.949E-03	0.115	0.46
TINI	Initial temp of the horizon	Normal	8	1.041E+00	6	10

Appendix 147. Parameterisation of probability distribution functions for PRZM parameters *(Pesticide L on Hodnet scenario)*

Parameter ZTH	Description	Distribution	Mean	Variance	Min	Max
ANET	Minimum depth for extraction of evaporation	Normal	15	2.603E+01	5	25
CINT	Maximum interception storage	Log-normal	0.15	8.901E-04	0.1	0.3
AMXD	Maximum rooting depth	Normal	60	3.189E+02	30	100
COVM	Maximum areal coverage of canopy	Normal	90	2.603E+01	80	100
HTMA	Maximum canopy height	Normal	55	2.603E+01	45	65
UPTK	Plant uptake factor	Normal	0.5	6.508E-02	0	1
PLDK	Pesticide decay rate on canopy	Log-normal	0.0298	9.987E-05	0.0149	0.0596
FEXT	Foliar extraction coefficient	Normal	0.1	6.508E-04	0.05	0.15
HENR	Henry's constant	Log-normal	-	-	-	-
ENPY	Enthalpy of vaporisation	Normal	20	6.508E+00	15	25
NF	Freundlich exponent	Normal	0.9	8.434E-03	0.72	1.08
A	Albedo	Normal	0.18	9.185E-04	0.1206	0.2394
EM	Emmissivity	Normal	0.96	1.041E-04	0.94	0.98
T	Average monthly temp at BB	Normal	8	1.041E+00	6	10
QTEN	Factor of decrease of degradation when Delta T =10C	Normal	2.2	5.271E-02	1.82	2.72
MEXP	Moisture exponent for degradation	Normal	0.7	2.041E-02	0.42	0.98
ASM	Reference moisture for degradation	Normal	0.349	1.006E-03	0.312	0.4363
BD	Bulk density	Normal	1.39	5.030E-03	1.251	1.529
FC	Field Capacity	Normal	0.349	1.006E-03	0.312	0.4363
DEG	Degradation rate	Log-normal	0.0298	9.987E-05	0.0149	0.0596
WP	Wilting point	Normal	0.168	4.592E-04	0.126	0.21
OC	Organic carbon content	Normal	1.15	4.758E-03	1.0148	1.2852
KD	Freundlich coefficient	Log-normal	1.15	1.487E-01	0.575	2.3
TINI	Initial temp of the horizon	Normal	8	1.041E+00	6	10

Appendix 148. Parameterisation of probability distribution functions for PRZM parameters *(Pesticide T on Hodnet scenario)*

	Mean	Standard deviation	Variance	Min	Max
ANET	14.9997	4.4513	19.8141	5.0979	24.9075
CINT	0.1514	0.0286	0.0008	0.1011	0.2531
AMXD	59.9959	14.3070	204.6906	30.0127	89.9324
COVM	90.0014	4.4546	19.8434	80.0977	99.9768
HTMA	54.9993	4.4554	19.8501	45.0846	64.9266
UPTK	0.4998	0.2226	0.0496	0.0039	0.9860
PLDK	0.0893	0.0268	0.0007	0.0450	0.1740
FEXT	0.1000	0.0223	0.0005	0.0513	0.1490
HENR	4.97E-07	5.15E-07	2.65E-13	5.16E-08	3.58E-06
ENPY	20.0004	2.2258	4.9544	15.0821	24.9016
NF	0.9000	0.0801	0.0064	0.7210	1.0794
A	0.1800	0.0264	0.0007	0.1216	0.2393
EM	0.9600	0.0089	0.0001	0.9405	0.9794
T	7.9998	0.8912	0.7943	6.0014	9.9986
QTEN	2.2174	0.1984	0.0394	1.8212	2.7122
MEXP	0.7000	0.1246	0.0155	0.4273	0.9793
ASM	0.2762	0.0333	0.0011	0.1983	0.3451
BD	1.3500	0.0602	0.0036	1.2163	1.4818
FC	0.2761	0.0333	0.0011	0.1985	0.3466
DEG	0.0893	0.0269	0.0007	0.0449	0.1776
WP	0.1054	0.0117	0.0001	0.0795	0.1311
OC	1.7000	0.0891	0.0079	1.5031	1.8990
KD	0.3401	0.1022	0.0104	0.1734	0.6713
TINI	7.9999	0.8901	0.7923	6.0404	9.9416

Appendix 149. Statistics for PRZM input parameters as generated by Monte Carlo sampling *(Pesticide L on Wick scenario)*

	Mean	Standard deviation	Variance	Min	Max
ANET	14.9994	4.4503	19.8056	5.2957	24.7629
CINT	0.1514	0.0286	0.0008	0.1005	0.2492
AMXD	60.0048	14.3038	204.5997	30.0317	89.4791
COVM	90.0009	4.4517	19.8178	80.0800	99.7947
HTMA	54.9999	4.4586	19.8793	45.0642	64.9565
UPTK	0.5000	0.2226	0.0496	0.0125	0.9867
PLDK	0.0298	0.0089	0.0001	0.0151	0.0586
FEXT	0.1000	0.0223	0.0005	0.0513	0.1491
HENR	-	-	-	-	-
ENPY	19.9994	2.2275	4.9617	15.0655	24.9564
NF	0.9000	0.0803	0.0064	0.7251	1.0794
A	0.1800	0.0264	0.0007	0.1224	0.2383
EM	0.9600	0.0089	0.0001	0.9401	0.9799
T	7.9995	0.8900	0.7920	6.0498	9.9429
QTEN	2.2172	0.1981	0.0392	1.8252	2.6993
MEXP	0.7000	0.1246	0.0155	0.4271	0.9740
ASM	0.2761	0.0333	0.0011	0.1984	0.3453
BD	1.3500	0.0601	0.0036	1.2171	1.4849
FC	0.2761	0.0333	0.0011	0.1971	0.3465
DEG	0.0298	0.0089	0.0001	0.0151	0.0575
WP	0.1054	0.0117	0.0001	0.0793	0.1316
OC	1.7000	0.0891	0.0079	1.5003	1.8956
KD	1.7000	0.5110	0.2611	0.8557	3.3665
TINI	7.9999	0.8903	0.7927	6.0259	9.9390

Appendix 150. Statistics for PRZM input parameters as generated by Monte Carlo sampling *(Pesticide T on Wick scenario)*

	Mean	Standard deviation	Variance	Min	Max
ANET	15.0000	4.4544	19.8415	5.0500	25.0000
CINT	0.1514	0.0286	0.0008	0.1000	0.2490
AMXD	60.0052	14.3039	204.6018	30.1000	89.8000
COVM	89.9984	4.4493	19.7966	80.3000	99.8000
HTMA	54.9988	4.4545	19.8430	45.3000	64.8000
UPTK	0.4999	0.2224	0.0495	0.0091	0.9900
PLDK	0.0893	0.0268	0.0007	0.0454	0.1780
FEXT	0.1000	0.0223	0.0005	0.0512	0.1490
HENR	5.01E-07	5.37E-07	2.88E-13	5.26E-08	4.16E-06
ENPY	19.9976	2.2273	4.9607	15.1000	24.9000
NF	0.9000	0.0801	0.0064	0.7240	1.0800
A	0.1800	0.0264	0.0007	0.1210	0.2390
EM	0.9600	0.0089	0.0001	0.9400	0.9800
T	8.0006	0.8903	0.7926	6.0400	9.9800
QTEN	2.2173	0.1981	0.0393	1.8200	2.7100
MEXP	0.7000	0.1245	0.0155	0.4260	0.9740
ASM	0.3560	0.0257	0.0007	0.3120	0.4330
BD	1.3900	0.0621	0.0039	1.2500	1.5300
FC	0.3560	0.0257	0.0007	0.3120	0.4330
DEG	0.0893	0.0268	0.0007	0.0451	0.1720
WP	0.1680	0.0187	0.0004	0.1260	0.2100
OC	1.1500	0.0605	0.0037	1.0200	1.2800
KD	0.2300	0.0691	0.0048	0.1170	0.4450
TINI	8.0000	0.8911	0.7940	6.0200	9.9900

Appendix 151. Statistics for PRZM input parameters as generated by Monte Carlo sampling *(Pesticide L on Hodnet scenario)*

	Mean	Standard deviation	Variance	Min	Max
ANET	15.0024	4.4505	19.8065	5.2964	24.9186
CINT	0.1514	0.0286	0.0008	0.1011	0.2520
AMXD	59.9977	14.3156	204.9351	30.2942	89.6068
COVM	89.9968	4.4525	19.8248	80.1526	99.7846
HTMA	54.9975	4.4540	19.8377	45.1006	64.7346
UPTK	0.4999	0.2227	0.0496	0.0090	0.9961
PLDK	0.0298	0.0089	0.0001	0.0151	0.0577
FEXT	0.1000	0.0223	0.0005	0.0509	0.1498
HENR	-	-	-	-	-
ENPY	20.0010	2.2279	4.9637	15.1445	24.9380
NF	0.9000	0.0802	0.0064	0.7224	1.0788
A	0.1800	0.0264	0.0007	0.1221	0.2382
EM	0.9600	0.0089	0.0001	0.9403	0.9794
T	8.0002	0.8908	0.7935	6.0338	9.9765
QTEN	2.2174	0.1981	0.0392	1.8225	2.7139
MEXP	0.7000	0.1248	0.0156	0.4240	0.9717
ASM	0.3560	0.0257	0.0007	0.3124	0.4343
BD	1.3900	0.0619	0.0038	1.2553	1.5254
FC	0.3560	0.0257	0.0007	0.3120	0.4313
DEG	0.0298	0.0090	0.0001	0.0150	0.0589
WP	0.1680	0.0187	0.0003	0.1269	0.2088
OC	1.1500	0.0603	0.0036	1.0188	1.2840
KD	1.1502	0.3461	0.1198	0.5858	2.2840
TINI	8.0002	0.8908	0.7935	6.0083	9.9617

Appendix 152. Statistics for PRZM input parameters as generated by Monte Carlo sampling *(Pesticide T on Hodnet scenario)*

Pesticide L on Wick	**Recharge (mm)**	**Pesticide losses (g ha^{-1})**
Number of successful model runs	250	250
Basic statistics		
Minimum value	2583.90	6.79E-07
Mean value	3074.82	75.84
Maximum value	3635.80	468.94
Range	1051.90	468.94
Frequency		
Minimum value	2583.90	6.79E-07
25th-percentile value	2933.28	11.29
Median value	3064.65	40.49
75th-percentile value	3208.30	106.20
Maximum value	3635.80	468.94
Dispersion		
Standard deviation	199.43	89.95
Variance	39773.21	8091.16
Standard error of the mean	12.61	5.69
Coefficient of variation	0.06	1.19

Appendix 153. Statistics for the PRZM output variables (Monte Carlo runs)
Pesticide L on Wick **scenario**

Pesticide T on Wick	**Recharge (mm)**	**Pesticide losses (g ha^{-1})**
Number of successful model runs	250	250
Basic statistics		
Minimum value	2642.10	0
Mean value	3075.35	19.73
Maximum value	3631.90	375.69
Range	989.80	375.69
Frequency		
Minimum value	2642.10	0
25th-percentile value	2925.93	0.02
Median value	3080.25	1.14
75th-percentile value	3206.20	16.90
Maximum value	3631.90	375.69
Dispersion		
Standard deviation	208.50	46.55
Variance	43473.17	2167.29
Standard error of the mean	13.19	2.94
Coefficient of variation	0.07	2.36

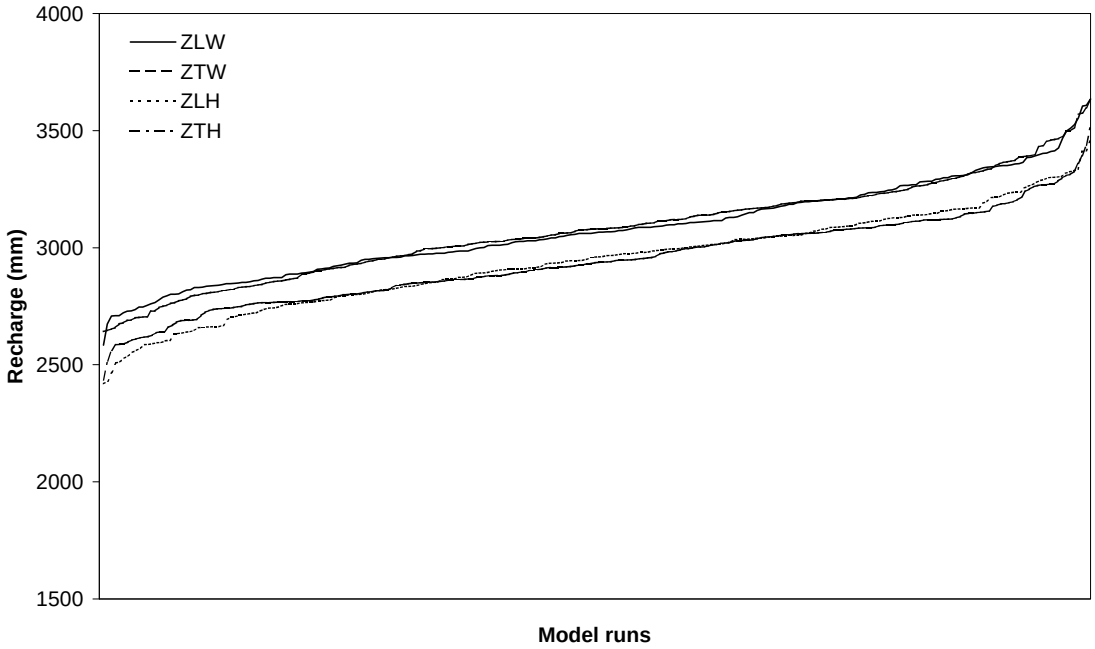
Appendix 154. Statistics for the PRZM output variables (Monte Carlo runs)
Pesticide T on Wick **scenario**

Pesticide L on Hodnet	**Recharge (mm)**	**Pesticide losses (g ha^{-1})**
Number of successful model runs	240	240
Basic statistics		
Minimum value	2419	3.62.E-15
Mean value	2942.98	5.18
Maximum value	3458.70	86.17
Range	1039.30	86.17
Frequency		
Minimum value	2419	3.62.E-15
25th-percentile value	2799.10	0.17
Median value	2959.90	1.28
75th-percentile value	3090.28	5.95
Maximum value	3458.70	86.17
Dispersion		
Standard deviation	207.86	9.42
Variance	43205.54	88.77
Standard error of the mean	13.42	0.61
Coefficient of variation	0.07	1.82

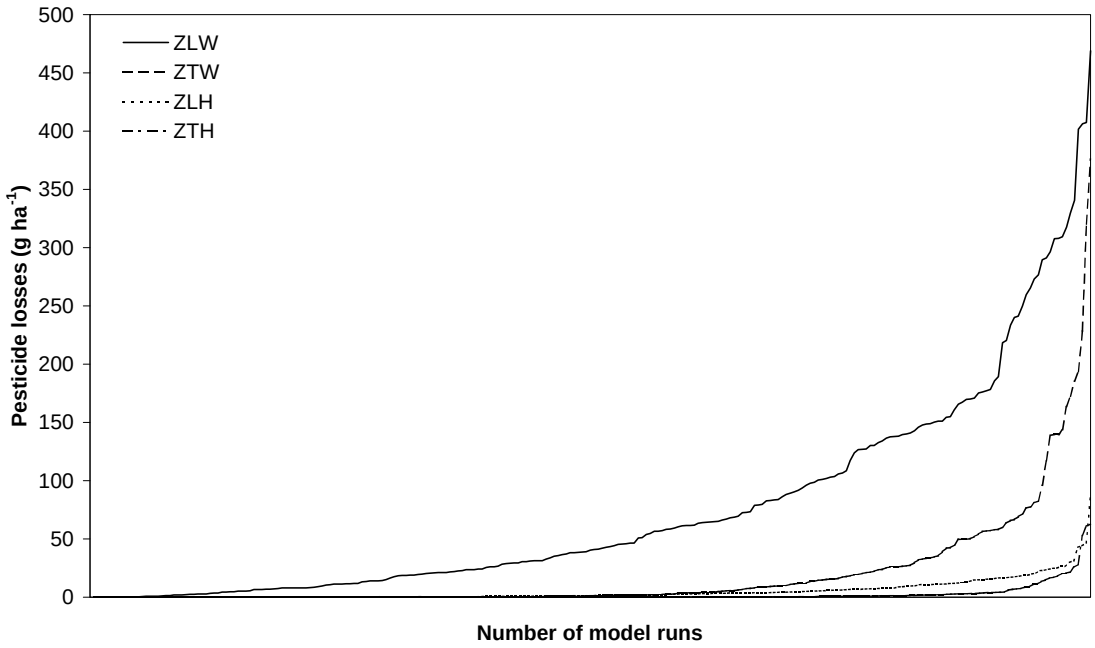
Appendix 155. Statistics for the PRZM output variables (Monte Carlo runs)
***Pesticide L on Hodnet* scenario**

Pesticide T on Hodnet	**Recharge (mm)**	**Pesticide losses (g ha^{-1})**
Number of successful model runs	244	244
Basic statistics		
Minimum value	2435	0
Mean value	2942.48	2.17
Maximum value	3518.60	62.72
Range	1083.90	62.72
Frequency		
Minimum value	2435	0
25th-percentile value	2801.50	1.97E-05
Median value	2936.70	0.01
75th-percentile value	3077.50	0.68
Maximum value	3518.60	62.72
Dispersion		
Standard deviation	187.62	7.61
Variance	35201.52	57.85
Standard error of the mean	12.01	0.49
Coefficient of variation	0.06	3.50

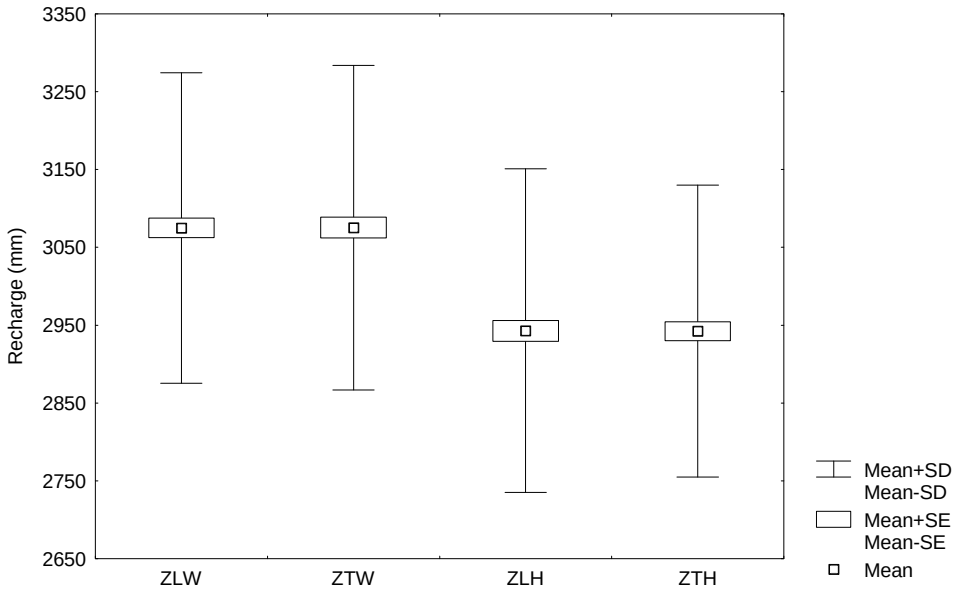
Appendix 156. Statistics for the PRZM output variables (Monte Carlo runs)
Pesticide T on Hodnet **scenario**



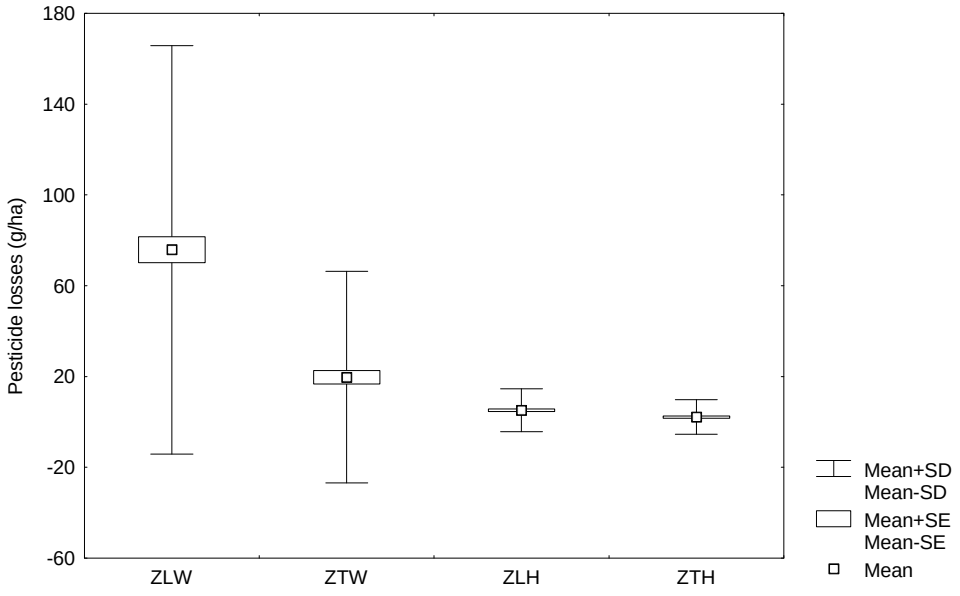
Appendix 157. Distribution of the percolation values obtained by running the different Monte Carlo-generated input files for the four scenarios (PRZM).



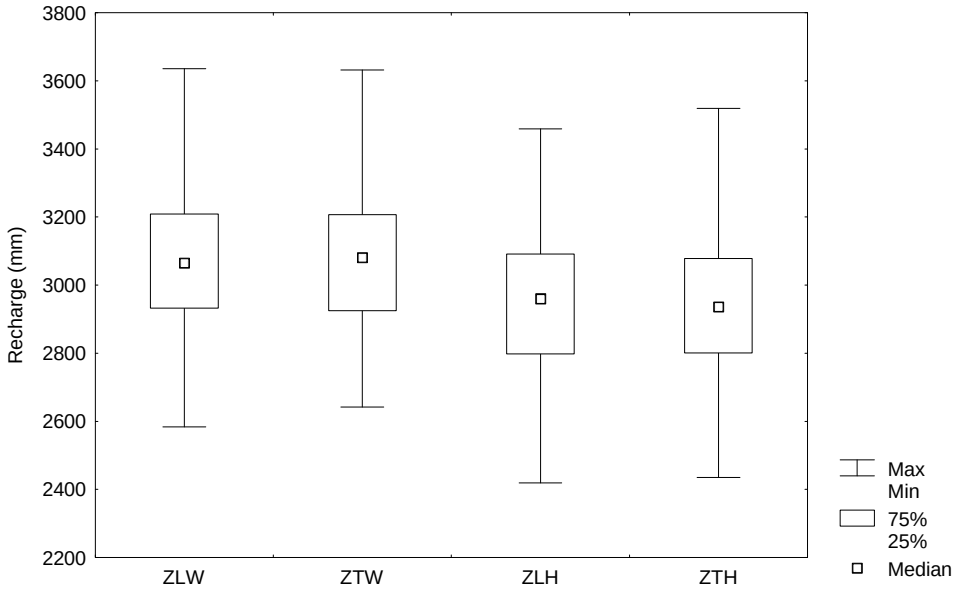
Appendix 158. Distribution of the values for pesticide losses obtained by running the different Monte Carlo-generated input files for the four scenarios (PRZM).



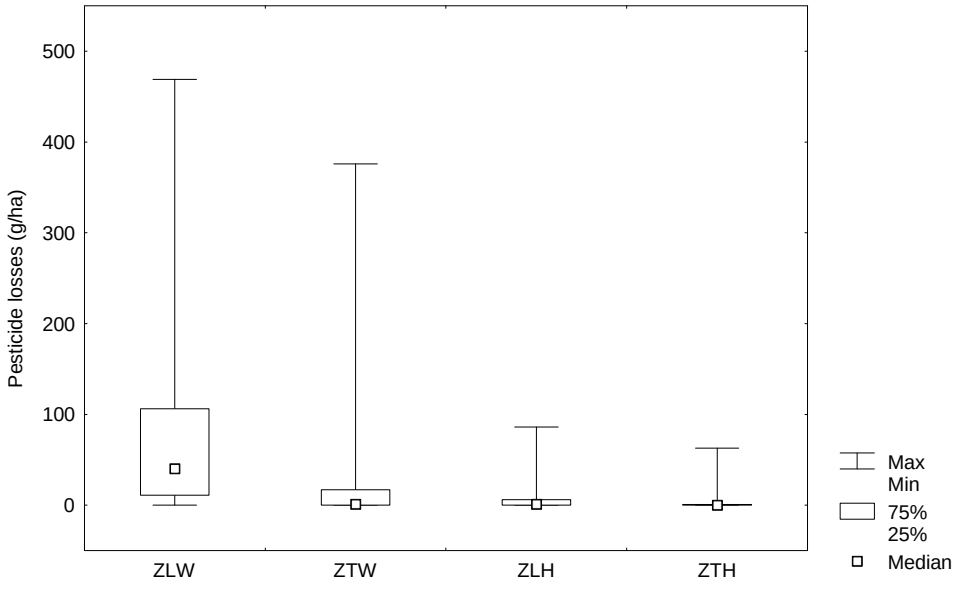
Appendix 159. Box plots presenting the mean, standard deviation and standard error of the mean for percolation values generated for the four scenarios



Appendix 160. Box plots presenting the mean, standard deviation and standard error of the mean for values of pesticide losses generated for the four scenarios



Appendix 161. Box plots presenting the median, the lower and upper quartiles and minimum and maximum values for percolation generated for the four scenarios



Appendix 162. Box plots presenting the median, the lower and upper quartiles and minimum and maximum values for pesticide losses generated for the four scenarios

Percolation		
Ranking	Parameter	Betas
1	FC	-0.7354
2	AMXD	-0.487
3	ANET	-0.3733
4	WP	0.2753
5	T	-0.0355
6	CINT	-0.0342
7	OC	-0.028
8	ASM	-0.0275
9	EM	-0.0219
10	COVM	-0.02
11	FEXT	0.0163
12	HTMA	0.0163
13	UPTK	0.0148
14	MEXP	0.0138
15	A	-0.0096
16	DEG	-0.0092
17	TINI	0.0088
18	KD	0.0079
19	QTEN	0.004
20	PLDK	0.0034
21	BD	0.0031
22	NF	0.0022

Pesticide losses		
Ranking	Parameter	Betas
1	DEG	-0.5904
2	KD	-0.5233
3	FC	-0.3634
4	QTEN	0.2779
5	NF	0.2425
6	ASM	0.1841
7	UPTK	-0.0696
8	BD	-0.0588
9	MEXP	0.0582
10	T	-0.0303
11	WP	0.0283
12	AMXD	-0.0247
13	TINI	0.0239
14	EM	0.023
15	A	0.0084
16	ANET	0.0059
17	COVM	-0.0057
18	CINT	-0.0044
19	OC	0.0031
20	HTMA	-0.0024
21	PLDK	0.0012
22	FEXT	-0.0011

Appendix 163. Classification of PRZM parameters according to their influence on percolation and pesticide losses, using the betas derived from a multiple linear regression on ranked data *Pesticide L on Wick* scenario

Percolation		
Ranking	Parameter	Betas
1	FC	-0.7569
2	AMXD	-0.4178
3	ANET	-0.3427
4	WP	0.2778
5	QTEN	-0.0265
6	KD	0.0251
7	BD	-0.0224
8	CINT	0.0203
9	COVM	0.0172
10	OC	-0.0151
11	EM	-0.0132
12	A	0.0104
13	NF	-0.0096
14	PLDK	0.0094
15	FEXT	-0.0094
16	DEG	-0.0091
17	TINI	0.0078
18	MEXP	-0.0078
19	ASM	-0.0065
20	T	0.0064
21	HTMA	0.0053
22	UPTK	0.0015

Pesticide losses		
Ranking	Parameter	Betas
1	KD	-0.547
2	NF	0.5228
3	DEG	-0.4498
4	FC	-0.2186
5	QTEN	0.2066
6	ASM	0.1286
7	BD	-0.0908
8	T	-0.0405
9	WP	0.0255
10	COVM	-0.0254
11	MEXP	0.0239
12	HTMA	-0.0199
13	EM	-0.0178
14	PLDK	-0.0155
15	AMXD	-0.0136
16	UPTK	-0.0108
17	ANET	-0.0097
18	OC	0.0097
19	TINI	0.009
20	FEXT	0.0084
21	CINT	-0.0022
22	A	-0.0011

Appendix 164. Classification of PRZM parameters according to their influence on percolation and pesticide losses, using the betas derived from a multiple linear regression on ranked data *Pesticide T on Wick* scenario

Percolation		
Ranking	Parameter	Betas
1	FC	-0.5609
2	AMXD	-0.4689
3	WP	0.4375
4	ANET	-0.3592
5	CINT	-0.0305
6	DEG	0.0259
7	KD	0.0255
8	MEXP	-0.02
9	BD	0.018
10	EM	-0.015
11	OC	0.0146
12	COVM	-0.0096
13	ASM	-0.0095
14	FEXT	0.0089
15	A	0.008
16	UPTK	0.0075
17	TINI	-0.0073
18	PLDK	0.0048
19	T	0.0031
20	HTMA	-0.003
21	QTEN	-0.0017
22	NF	0.0013

Pesticide losses		
Ranking	Parameter	Betas
1	DEG	-0.6388
2	KD	-0.479
3	NF	0.462
4	QTEN	0.2804
5	FC	-0.2635
6	ASM	0.086
7	BD	-0.0793
8	MEXP	0.0573
9	T	-0.056
10	UPTK	-0.0542
11	TINI	0.053
12	ANET	-0.031
13	A	0.028
14	CINT	0.0263
15	FEXT	-0.0248
16	PLDK	0.0203
17	AMXD	-0.0187
18	HTMA	-0.0069
19	EM	-0.0036
20	COVM	0.0035
21	WP	-0.0032
22	OC	0.0019

Appendix 165. Classification of PRZM parameters according to their influence on percolation and pesticide losses, using the betas derived from a multiple linear regression on ranked data *Pesticide L on Hodnet* scenario

Percolation		
Ranking	Parameter	Betas
1	FC	-0.6279
2	AMXD	-0.5325
3	WP	0.4624
4	ANET	-0.4093
5	PLDK	-0.0367
6	CINT	0.0323
7	EM	-0.0316
8	OC	-0.0311
9	T	0.0278
10	DEG	0.0246
11	MEXP	0.0227
12	QTEN	-0.0183
13	HTMA	-0.0164
14	BD	0.0095
15	TINI	-0.0066
16	ASM	-0.0063
17	A	-0.0051
18	KD	0.005
19	UPTK	-0.0043
20	COVM	-0.0024
21	NF	-0.0018
22	FEXT	-0.0009

Pesticide losses		
Ranking	Parameter	Betas
1	NF	0.6835
2	KD	-0.4506
3	DEG	-0.4304
4	QTEN	0.1972
5	FC	-0.1215
6	ASM	0.0545
7	BD	-0.0472
8	T	-0.0438
9	MEXP	0.0313
10	UPTK	-0.0225
11	AMXD	0.022
12	EM	-0.021
13	ANET	-0.0209
14	OC	0.019
15	A	0.0177
16	FEXT	0.0145
17	TINI	0.0145
18	COVM	0.0122
19	HTMA	0.0118
20	PLDK	0.0028
21	WP	0.0028
22	CINT	-0.0018

Appendix 166. Classification of PRZM parameters according to their influence on percolation and pesticide losses, using the betas derived from a multiple linear regression on ranked data *Pesticide T on Hodnet* scenario

	ZLW		ZTW		ZLH		ZTH	
	Beta	Rank	Beta	Rank	Beta	Rank	Beta	Rank
ANET	-0.3849	3	-0.3680	3	-0.3702	4	-0.4375	4
CINT	-0.0208	6	-0.0079	12	-0.0318	5	0.0066	14
AMXD	-0.4714	2	-0.4247	2	-0.4594	3	-0.5438	2
COVM	-0.0073	9	0.0124	8	-0.0091	10	-0.0182	5
HTMA	0.0045	17	0.0043	15	0.0104	9	-0.0053	15
UPTK	0.0066	10	-0.0059	13	0.0086	11	-0.0011	20
PLDK	0.0021	19	0.0148	6	-0.0028	18	-0.0131	7
FEXT	0.0065	11	-0.0009	19	0.0004	22	-0.0023	17
NF	0.0078	8	-0.0020	18	0.0065	14	-0.0101	11
A	0.0012	21	0.0091	10	0.0037	16	0.0088	12
EM	0.0007	22	-0.0030	17	-0.0119	8	-0.0127	9
T	-0.0300	5	0.0035	16	0.0015	19	0.0000	22
QTEN	0.0048	15	-0.0153	5	0.0012	20	0.0048	16
MEXP	-0.0037	18	-0.0007	21	-0.0077	12	0.0007	21
ASM	-0.0079	7	-0.0008	20	0.0010	21	-0.0165	6
BD	0.0050	14	-0.0129	7	-0.0035	17	-0.0113	10
FC	-0.7543	1	-0.7753	1	-0.5774	1	-0.6278	1
DEG	-0.0016	20	-0.0107	9	0.0146	7	0.0021	18
WP	0.2871	4	0.2799	4	0.4630	2	0.4851	3
OC	-0.0062	12	-0.0085	11	-0.0072	13	-0.0013	19
KD	0.0047	16	-0.0053	14	0.0152	6	0.0088	13
TINI	-0.0053	13	0.0001	22	0.0039	15	-0.0129	8

Appendix 167. Sensitivity of percolation in PRZM as calculated from the untransformed data for the four scenarios.

Betas are the coefficients of a normalised regression
The ranking has been performed on absolute betas

	ZLW		ZTW		ZLH		ZTH	
	Beta	Rank	Beta	Rank	Beta	Rank	Beta	Rank
ANET	-0.0071	18	0.0746	11	0.0414	11	-0.0510	12
CINT	-0.0117	17	-0.0701	13	0.0703	7	0.1133	6
AMXD	-0.0443	8	0.0024	22	0.0201	16	-0.0659	10
COVM	0.0185	13	0.0622	14	-0.0140	19	0.0247	18
HTMA	-0.0292	11	-0.0261	19	0.0341	12	-0.0762	7
UPTK	-0.0325	10	-0.0115	20	0.0140	20	0.0425	15
PLDK	-0.0190	12	0.1295	6	0.0205	15	-0.0242	19
FEXT	0.0156	15	-0.0716	12	0.0175	18	-0.0325	17
NF	0.1243	5	0.2759	3	0.2551	5	0.3187	1
A	0.0036	22	-0.0609	15	-0.0428	10	-0.0508	13
EM	-0.0036	21	0.0474	16	-0.0658	8	0.0480	14
T	-0.0174	14	0.0432	18	-0.0246	13	-0.0749	9
QTEN	0.2138	4	0.1186	8	0.2609	4	-0.0039	22
MEXP	0.0354	9	0.1890	4	0.0528	9	-0.0122	21
ASM	0.1130	6	0.0878	10	0.0830	6	0.1155	5
BD	-0.0649	7	-0.1212	7	-0.0138	21	-0.0384	16
FC	-0.3674	3	-0.1829	5	-0.2859	3	-0.2049	4
DEG	-0.5413	1	-0.3044	1	-0.4635	1	-0.2757	2
WP	0.0058	19	-0.1127	9	-0.0236	14	0.0758	8
OC	-0.0135	16	-0.0106	21	-0.0042	22	0.0603	11
KD	-0.4304	2	-0.2918	2	-0.2901	2	-0.2712	3
TINI	0.0043	20	-0.0447	17	0.0197	17	-0.0145	20

Appendix 168. Sensitivity of pesticide losses in PRZM as calculated from the untransformed data for the four scenarios.

Betas are the coefficients of a normalised regression

The ranking has been performed on absolute betas

	ZLW		ZTW		ZLH		ZTH	
	Beta	Rank	Beta	Rank	Beta	Rank	Beta	Rank
ANET	-0.3733	3	-0.3427	3	-0.3592	4	-0.4093	4
CINT	-0.0342	6	0.0203	8	-0.0305	5	0.0323	6
AMXD	-0.4870	2	-0.4178	2	-0.4689	2	-0.5325	2
COVM	-0.0200	10	0.0172	9	-0.0096	12	-0.0024	20
HTMA	0.0163	12	0.0053	21	-0.0030	20	-0.0164	13
UPTK	0.0148	13	0.0015	22	0.0075	16	-0.0043	19
PLDK	0.0034	20	0.0094	14	0.0048	18	-0.0367	5
FEXT	0.0163	11	-0.0094	15	0.0089	14	-0.0009	22
NF	0.0022	22	-0.0096	13	0.0013	22	-0.0018	21
A	-0.0096	15	0.0104	12	0.0080	15	-0.0051	17
EM	-0.0219	9	-0.0132	11	-0.0150	10	-0.0316	7
T	-0.0355	5	0.0064	20	0.0031	19	0.0278	9
QTEN	0.0040	19	-0.0265	5	-0.0017	21	-0.0183	12
MEXP	0.0138	14	-0.0078	18	-0.0200	8	0.0227	11
ASM	-0.0275	8	-0.0065	19	-0.0095	13	-0.0063	16
BD	0.0031	21	-0.0224	7	0.0180	9	0.0095	14
FC	-0.7354	1	-0.7569	1	-0.5609	1	-0.6279	1
DEG	-0.0092	16	-0.0091	16	0.0259	6	0.0246	10
WP	0.2753	4	0.2778	4	0.4375	3	0.4624	3
OC	-0.0280	7	-0.0151	10	0.0146	11	-0.0311	8
KD	0.0079	18	0.0251	6	0.0255	7	0.0050	18
TINI	0.0088	17	0.0078	17	-0.0073	17	-0.0066	15

Appendix 169. Sensitivity of percolation in PRZM as calculated from the transformed data for the four scenarios.

The transformation consisted in replacing parameter values by their rank
Betas are the coefficients of a normalised regression
The ranking has been performed on absolute betas

	ZLW		ZTW		ZLH		ZTH	
	Beta	Rank	Beta	Rank	Beta	Rank	Beta	Rank
ANET	0.0059	16	-0.0097	17	-0.0310	12	-0.0209	13
CINT	-0.0044	18	-0.0022	21	0.0263	14	-0.0018	22
AMXD	-0.0247	12	-0.0136	15	-0.0187	17	0.0220	11
COVM	-0.0057	17	-0.0254	10	0.0035	20	0.0122	18
HTMA	-0.0024	20	-0.0199	12	-0.0069	18	0.0118	19
UPTK	-0.0696	7	-0.0108	16	-0.0542	10	-0.0225	10
PLDK	0.0012	21	-0.0155	14	0.0203	16	0.0028	20
FEXT	-0.0011	22	0.0084	20	-0.0248	15	0.0145	16
NF	0.2425	5	0.5228	2	0.4620	3	0.6835	1
A	0.0084	15	-0.0011	22	0.0280	13	0.0177	15
EM	0.0230	14	-0.0178	13	-0.0036	19	-0.0210	12
T	-0.0303	10	-0.0405	8	-0.0560	9	-0.0438	8
QTEN	0.2779	4	0.2066	5	0.2804	4	0.1972	4
MEXP	0.0582	9	0.0239	11	0.0573	8	0.0313	9
ASM	0.1841	6	0.1286	6	0.0860	6	0.0545	6
BD	-0.0588	8	-0.0908	7	-0.0793	7	-0.0472	7
FC	-0.3634	3	-0.2186	4	-0.2635	5	-0.1215	5
DEG	-0.5904	1	-0.4498	3	-0.6388	1	-0.4304	3
WP	0.0283	11	0.0255	9	-0.0032	21	0.0028	21
OC	0.0031	19	0.0097	18	0.0019	22	0.0190	14
KD	-0.5233	2	-0.5470	1	-0.4790	2	-0.4506	2
TINI	0.0239	13	0.0090	19	0.0530	11	0.0145	17

Appendix 170. Sensitivity of pesticide losses in PRZM as calculated from the transformed data for the four scenarios.

The transformation consisted in replacing parameter values by their rank
Betas are the coefficients of a normalised regression

	ZLW		ZTW		ZLH		ZTH	
	Beta	Rank	Beta	Rank	Beta	Rank	Beta	Rank
FC	-0.7354	1	-0.7569	1	-0.5609	1	-0.6279	1
AMXD	-0.4870	2	-0.4178	2	-0.4689	2	-0.5325	2
ANET	-0.3733	3	-0.3427	3	-0.3592	4	-0.4093	4
WP	0.2753	4	0.2778	4	0.4375	3	0.4624	3
CINT	-0.0342	6	0.0203	8	-0.0305	5	0.0323	6
OC	-0.0280	7	-0.0151	10	0.0146	11	-0.0311	8
EM	-0.0219	9	-0.0132	11	-0.0150	10	-0.0316	7
T	-0.0355	5	0.0064	20	0.0031	19	0.0278	9
DEG	-0.0092	16	-0.0091	16	0.0259	6	0.0246	10
MEXP	0.0138	14	-0.0078	18	-0.0200	8	0.0227	11
KD	0.0079	18	0.0251	6	0.0255	7	0.0050	18
PLDK	0.0034	20	0.0094	14	0.0048	18	-0.0367	5
BD	0.0031	21	-0.0224	7	0.0180	9	0.0095	14
QTEN	0.0040	19	-0.0265	5	-0.0017	21	-0.0183	12
ASM	-0.0275	8	-0.0065	19	-0.0095	13	-0.0063	16
COVM	-0.0200	10	0.0172	9	-0.0096	12	-0.0024	20
HTMA	0.0163	12	0.0053	21	-0.0030	20	-0.0164	13
FEXT	0.0163	11	-0.0094	15	0.0089	14	-0.0009	22
A	-0.0096	15	0.0104	12	0.0080	15	-0.0051	17
TINI	0.0088	17	0.0078	17	-0.0073	17	-0.0066	15
UPTK	0.0148	13	0.0015	22	0.0075	16	-0.0043	19
NF	0.0022	22	-0.0096	13	0.0013	22	-0.0018	21

Appendix 171. Classification of PRZM parameters according to their influence on percolation as determined from the betas of a multiple linear regression on the ranked data from the Monte Carlo sampling runs

The ranking was performed on absolute values of betas
A positive (resp. negative) beta means that an increase in the value of the parameter will result in an increase (resp. decrease) in percolation

	ZLW		ZTW		ZLH		ZTH	
	Beta	Rank	Beta	Rank	Beta	Rank	Beta	Rank
DEG	-0.5904	1	-0.4498	3	-0.6388	1	-0.4304	3
KD	-0.5233	2	-0.5470	1	-0.4790	2	-0.4506	2
NF	0.2425	5	0.5228	2	0.4620	3	0.6835	1
FC	-0.3634	3	-0.2186	4	-0.2635	5	-0.1215	5
QTEN	0.2779	4	0.2066	5	0.2804	4	0.1972	4
ASM	0.1841	6	0.1286	6	0.0860	6	0.0545	6
BD	-0.0588	8	-0.0908	7	-0.0793	7	-0.0472	7
MEXP	0.0582	9	0.0239	11	0.0573	8	0.0313	9
T	-0.0303	10	-0.0405	8	-0.0560	9	-0.0438	8
UPTK	-0.0696	7	-0.0108	16	-0.0542	10	-0.0225	10
TINI	0.0239	13	0.0090	19	0.0530	11	0.0145	17
AMXD	-0.0247	12	-0.0136	15	-0.0187	17	0.0220	11
ANET	0.0059	16	-0.0097	17	-0.0310	12	-0.0209	13
EM	0.0230	14	-0.0178	13	-0.0036	19	-0.0210	12
WP	0.0283	11	0.0255	9	-0.0032	21	0.0028	21
A	0.0084	15	-0.0011	22	0.0280	13	0.0177	15
FEXT	-0.0011	22	0.0084	20	-0.0248	15	0.0145	16
COVM	-0.0057	17	-0.0254	10	0.0035	20	0.0122	18
HTMA	-0.0024	20	-0.0199	12	-0.0069	18	0.0118	19
PLDK	0.0012	21	-0.0155	14	0.0203	16	0.0028	20
CINT	-0.0044	18	-0.0022	21	0.0263	14	-0.0018	22
OC	0.0031	19	0.0097	18	0.0019	22	0.0190	14

Appendix 172. Classification of PRZM parameters according to their influence on pesticide losses as determined from the betas of a multiple linear regression on the ranked data from the Monte Carlo sampling runs

The ranking was performed on absolute values of betas
A positive (resp. negative) beta means that an increase in the value of the parameter will result in an increase (resp. decrease) in pesticide losses

	Percolation		Pesticide losses	
	Non-ranked	Ranked	Non-ranked	Ranked
ZLW	0.987	0.951	0.710	0.948
ZTW	0.983	0.947	0.471	0.930
ZLH	0.982	0.940	0.496	0.933
ZTH	0.978	0.940	0.343	0.956

Appendix 173. Comparison of the results from the multiple linear regressions (R^2 values) for raw and transformed date for the four scenarios (PRZM)

The transformation consisted in the replacement of values by their rank.

Sensitivity analysis of pesticide registration models

Appendices for PESTLA

Appendix 174. Example of soil water and profile file (*.swa) for SWAP (Pesticide L on Wick scenario)

```
*****************************************************************************
* Filename: PestlStd.SWA
* Contents: SWAP 2.0.7 - Soil water and profile data
*****************************************************************************
* Comment area:
*
*
*
*****************************************************************************


*****************************************************************************
* Section 1: Ponding
*
 PONDMX = 0.0  ! Maximum thickness of ponding water layer, [0..1000 cm, R]
*****************************************************************************


*****************************************************************************
* Section 2: Soil evaporation
*
  SWCFBS = 1   ! Switch for use of coefficient (CFBS) for soil evaporation [Y=1, N=0]
*                0 = CFBS is not used
*                1 = CFBS used to calculate ES0 from ET0, ETR or ESO
*
* If SWCFBS = 1 then specify CFBS, else a dummy value may entered for CFBS:
  CFBS   = 1.0 ! Coefficient for soil evaporation [0.5..1.5 -, R]
*
 SWREDU = 2    ! Switch, method for reduction of soil evaporation:
*              0 = reduction to maximum Darcy flux
*              1 = reduction to maximum Darcy flux and to maximum Black (1969)
*              2 = reduction to maximum Darcy flux and to maximum Bo/Str. (1986)

 COFRED = .6300000 ! Soil evaporation coefficient of Black, [0..1 cm/d1/2, R],
*                or Boesten/Stroosnijder, [0..1 cm1/2, R]
 RSIGNI = .5000000 ! Minimum rainfall to reset models Black and Bo/Str., [0..1 cm/d, R]
*****************************************************************************


*****************************************************************************
* Section 3: Time discretization of Richards' equation
*
 DTMIN  = 1.000e-5 ! Minimum timestep, [1.E-8..0.1 d, R]
 DTMAX  = .2000000 ! Maximum timestep, [ 0.01..0.5 d, R]
 SWNUMS =      2 ! Type of implicit scheme:
*                 1 = Richards equation is solved twice per time step
*                 2 = Richards equation is solved until convergence (use in general)
 THETOL = .0010000 ! Maximum dif. water content between iterations, [1.E-5..0.01 cm3/cm3]
*****************************************************************************


*****************************************************************************
* Section 4: Spatial discretization
*
 NUMLAY = 4      ! Number of soil layers, [1..5, I]
 NUMNOD = 40     ! number of soil compartments, [1..40, I]

* List compartment number at bottom of each soil layer (max 5), [1..40, I]:
  BOTCOM =    8  20  30  40
* List thickness of each soil compartment (max 40), [1.E-6..500 cm, R]:
  DZ =
    2.5    2.5    2.5    2.5    2.5    2.5    2.5    2.5    2.5    2.5
    2.5    2.5    2.5    2.5    2.5    2.5    2.5    2.5    2.5    2.5
    2.5    2.5    2.5    2.5    2.5    2.5    2.5    2.5    2.5    2.5
    2.5    2.5    2.5    2.5    2.5    2.5    2.5    2.5    2.5    2.5
*****************************************************************************


*****************************************************************************
* Section 5: Soil hydraulic function files, soil texture and maximum rooting depth
*
```

```
* Specify for each soil layer (max 5) the hydr. function file without .SOL ext., [A8]
  SOLFIL =      'wl1'  'wl2'  'wl3'  'wl4'
*
* Specify for each soil layer (max. 5) the soil texture (g/g mineral parts) and
* the organic matter content (g/g dry soil)
*    PSAND    PSILT    PCLAY    ORGMAT
      .5700000  .3300000  .1000000  .0292000
      .7000000  .2000000  .1000000  .0138000
      .7300000  .1600000  .1100000  .0052000
      .7700000  .0900000  .1400000  .0034000
* End of table

  RDS  = 80.00000  ! Maximum rooting depth allowed by the soil profile, [1..1000 cm, R]
*******************************************************************************


*******************************************************************************
* Section 6: Hysteresis of soil water retention function
*
  SWHYST = 0   ! Switch, hysteresis:
*               0 = no hysteresis
*               1 = hysteresis, initial condition wetting
*               2 = hysteresis, initial condition drying

* If SWHYST=1 or 2, specify:
  TAU = 0.2    ! Minimum pressure head difference to change wetting-drying, [0..1 cm, R]
*******************************************************************************


*******************************************************************************
* Section 7: Similar media scaling of soil hydraulic functions
*
  SWSCAL = 0 ! Switch, similar media scaling [Y=1, N=0]

* If SWSCAL = 1, specify:
  NSCALE = 3 ! Number of runs, [1..30, I]
  ISCLAY = 1 ! Number of soil layer to which scaling is applied, [1..5, I]

* List scaling factor of each run (max. 30), [0..100, R]
  FSCALE =
  0.45   1.00   2.50   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   0.00   0.00
  0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00
*******************************************************************************


*******************************************************************************
* Section 8: Preferential flow due to soil volumes with immobile water
*
  SWMOBI = 0  ! Switch, preferential flow due to immobile water, [Y=1, N=0]

* If SWMOBI = 1, specify mobile fraction as function of log -h for each soil layer:
* PF1    first datapoint,  log -h (cm), [0..5, R]
* FM1    first datapoint,  mobile fraction (1.0 = totally mobile), [0..1, R]
* PF2    second datapoint, log -h (cm), [0..5, R]
* FM2    second datapoint, mobile fraction (1.0 = totally mobile), [0..1, R]
* Also specify volumetric water content in immobile soil volume (THETIM), [0..0.3, R]
*   PF1    FM1    PF2    FM2   THETIM
    0.0    0.4    3.0    0.4    0.02
    0.0    1.0    3.0    1.0    0.02
* End of table
*******************************************************************************


*******************************************************************************
* Section 9: Preferential flow due to soil cracks
*
  SWCRACK = 0  ! Switch, soil cracks, [Y=1, N=0]

* If SWCRACK = 1, specify:
  SHRINA = 0.53   ! Void ratio at zero water content, [0..2 cm3/cm3, R]
  MOISR1 = 1.0    ! Moisture ratio at trans. residual --> normal shrinkage [0..5 cm3/cm3, R]
  MOISRD = 0.05   ! Structural shrinkage, [0..1 cm3/cm3, R]
  ZNCRACK = -5.0  ! Depth at which crack area of soil surface has been performed [-100..0 cm,
R]
  GEOMF = 3.0     ! Geometry factor (3 = isotropic shrinkage), [0..100, R]
  DIAMPOL = 40.0  ! Diameter soil matrix polygon, [0..100 cm, R]
```

```
  RAPCOEF = 0.0   ! Rate coef. bypass flow from cracks to surface water [0..10000 /d, R]
  DIFDES = 0.2    ! Effective lateral solute diffusion coefficient, [0..10000 /d, R]

* If SWCRACK = 1, specify also crit. water content of each soil layer (max. 5), [0..1, R];
* if actual water becomes smaller than critical water content, cracks are formed
  THETCR = 0.35  0.40
*******************************************************************************


*******************************************************************************
* Section 10: Vertical distribution drainage flux in saturated part soil column
*
  SWDIVD = 0 ! Switch, apply vertical distribution [Y=1, N=0]

* If SWDIVD = 1, specify anisotropy factor (vertical/horizontal saturated hydraulic
* conductivity) for each soil layer (max. 5), [0..1000 -, R] :
  COFANI =    1.0    1.0    1.0    1.0    1.0
*******************************************************************************


*******************************************************************************
* Section 11: Initial moisture condition
*
 SWINCO = 1 ! Switch, type of initial moisture condition:
*             1 = pressure head of each compartment is input
*             2 = pressure head of each compartment is in hydrostatic equilibrium with
*                 initial groundwater table

* If SWINCO = 1, specify initial h (max 40), [-1.E10..1.E4 cm, R]:
  HI =
 -50.0000  -50.0000 -50.0000 -50.0000 -50.0000 -50.0000 -50.0000 -50.0000 -50.0000 -50.0000
 -50.0000  -50.0000 -50.0000 -50.0000 -50.0000 -50.0000 -50.0000 -50.0000 -50.0000 -50.0000
 -50.0000  -50.0000 -50.0000 -50.0000 -50.0000 -50.0000 -50.0000 -50.0000 -50.0000 -50.0000
 -50.0000  -50.0000 -50.0000 -50.0000 -50.0000 -50.0000 -50.0000 -50.0000 -50.0000 -50.0000

* If SWINCO = 2, specify:
  GWLI   = -100.0  ! Initial groundwater level, [-5000..100 cm, R]

* End of file *****************************************************************
```

Appendix 175. Example of soil hydraulic functions file (*.sol) for SWAP (Pesticide L on Wick scenario)

```
*******************************************************************************
* Filename: B1.sol
* Contents: SWAP 2.0 - Soil hydraulic functions
*******************************************************************************
* Comment area:
*
*
*******************************************************************************


*******************************************************************************
* Section 1: Method
*
  SWPHYS = 1  ! Switch, method to describe soil hydraulic functions:
*               0 = Table
*               1 = Analytical function of Mualem - Van Genuchten (1980)
*******************************************************************************

*******************************************************************************
* Section 2: Table
*
* Specify pressure head [cm, negative] and hydraulic conductivity [cm/d] as function of
* water content [cm3/cm3];
* start with the lowest water content (corresponding pressure head should be smaller than
* -1.0E6) and use increments of 0.01 until the saturated water content:

* theta  H_theta       K_theta
  0.020 -5.658312E+06  5.678438E-10
  0.030 -3.863693E+04  3.599819E-08
    \       \             \
    /       /             /
    \       \             \
  0.430  0.000000E+00  9.650000E+00
* End of table
*******************************************************************************

*******************************************************************************
* Section 3: Analytical function of Mualem - Van Genuchten (1980)
*
  COFGEN1 = .10480000 ! Residual moisture content, [0..0.4 cm3/cm3, R]
  COFGEN2 = .46020000 ! Saturated moisture content, [0..0.95 cm3/cm3, R]
  COFGEN3 = 288.00000 ! Saturated hydraulic conductivity, [0.01..1000 cm/d, R]
  COFGEN4 = .07280000 ! Alpha main drying curve drying, [0.0001..1 /cm, R]
  COFGEN5 =       0.5 ! Exponent in hydraulic conductivity function, [-25..25 -, R]
  COFGEN6 = 1.4508000 ! Parameter n, [1..5 -, R]
  COFGEN8 =     0.090 ! Alpha main wetting curve, [0.0001..1 /cm, R]

* End of file ********************************************************************
```

Appendix 176. Example of heat flow file (*.hea) for SWAP (Pesticide L on Wick scenario)

```
********************************************************************************
* Filename: PestlStd.HEA
* Contents: SWAP 2.0.7 - Heat flow data
********************************************************************************
* Comment area:
*
*
*
********************************************************************************

********************************************************************************
* Section 1: Method
*
  SWSHF = 2     ! Switch, method:
*                 1 = Use analytical method
*                 2 = Use numerical method
********************************************************************************


********************************************************************************
* Section 2: Analytical method
*
  TAMPLI = 8.0 ! Amplitude of annual temperature wave at soil surface, [0..50 C, R]
  TMEAN  = 8.0 ! Mean annual temperature at soil surface, [5..30 C, R]
  DDAMP  = 50.0 ! Damping depth of temperature wave in soil, [0..500 cm, R]
  TIMREF = 90.0 ! Day number (Jan 1 = 1) at top sine temperature wave [1..366 d, I]
********************************************************************************


********************************************************************************
* Section 3: Numerical method
*
* List initial temperature of each compartment (max 40), [-10..40 C, R]
  TEMPI =
 8.00000 8.00000 8.00000 8.00000 8.00000 8.00000 8.00000 8.00000 8.00000 8.00000
 8.00000 8.00000 8.00000 8.00000 8.00000 8.00000 8.00000 8.00000 8.00000 8.00000
 8.00000 8.00000 8.00000 8.00000 8.00000 8.00000 8.00000 8.00000 8.00000 8.00000
 8.00000 8.00000 8.00000 8.00000 8.00000 8.00000 8.00000 8.00000 8.00000 8.00000

* End of file ******************************************************************
```

Appendix 177. Example of crop file (*.crp) for SWAP (Pesticide L on Wick scenario)

```
*******************************************************************************
* Filename: wheatS.CRP
* Contents: SWAP 2.0.7a - Crop data of simple model
*******************************************************************************
*c Comment area:
*c
*c
*c
*******************************************************************************

*******************************************************************************
* Section 1: Crop development
*
  IDEV = 1   ! Length of crop cycle: 1 = fixed, 2 = variable

* If IDEV = 1, specify:
  LCC  =  310      ! Length of crop cycle [1..366 days, I]

* If IDEV = 2, specify:
  TSUMEA = 1050.0 ! Temperature sum from emergence to anthesis, [0..10000 C, R]
  TSUMAM = 1000.0 ! Temperature sum from anthesis  to maturity, [0..10000 C, R]
  TBASE  = 0.0    ! Start value of temperature sum, [-10..20 C, R]
*******************************************************************************


*******************************************************************************
* Section 2: Light extinction
*
  KDIF   = .600000  ! Extinction coefficient for diffuse visible light, [0..2 -, R]
  KDIR   = .750000  ! Extinction coefficient for direct  visible light, [0..2 -, R]
*******************************************************************************


*******************************************************************************
* Section 3: Leaf area index or soil cover fraction
*
  SWGC = 1 ! choice between LAI [=1] or soil cover fraction [=2]
*
* If SWGC = 1, list leaf area index [0..12 ha/ha, R],    as function of dev. stage [0..2 -,R]:
* If SWGC = 2, list soil cover fraction [0..1 m2/m2, R], as function of dev. stage [0..2 -,R]:
*        DVS   LAI or SCF  (maximum 36 records)
 GCTB =
 0.00  0.0
 1.23  0.1
 1.5   6.200000
 2.00  6.200000
* End of table
*******************************************************************************


*******************************************************************************
* Section 4: crop factor or crop height
*
  SWCF = 1 ! choice between crop factor [=1] or crop height [=2]
*
* If SWCF = 1, list crop factor [0.5..1.5, R],   as function of dev. stage [0..2 -,R]:
* If SWCF = 2, list crop height [0..1000 cm, R], as function of dev. stage [0..2 -,R]:
*
*        DVS   CF or CH   (maximum 36 records)
  CFTB =
  0.00 1.00
  1.23 1.00
  1.5  .7500000
  2.00 .7500000
* End of table
*******************************************************************************


*******************************************************************************
* Section 5: Rooting depth
*
* List rooting depth [0..1000 cm, R], as function of development stage [0..2 -, R]:
*        DVS   RD  (maximum 36 records)
 RDTB = 0.00    0.0
```

```
        1.5     80.00000
        2.00    80.00000
*****************************************************************************


*****************************************************************************
* Section 6: Yield response
*
* List yield response factor [0..5 -, R], as function of development stage [0..2 -, R]:
*         DVS   KY  (maximum 36 records)
  KYTB = 0.00  1.0
         2.00  1.0
*****************************************************************************


*****************************************************************************
* Section 7: Crop water use
*
 HLIM1  =     0.0 ! No water extraction at higher pressure heads, [-100..100 cm, R]
 HLIM2U =    -1.0 ! h below which optimal water extr. starts for top layer, [-1000..100 cm, R]
 HLIM2L =    -1.0 ! h below which optimal water extr. starts for sub layer, [-1000..100 cm, R]
 HLIM3H =  -500.0 ! h below which water uptake red. starts at high Tpot, [-10000..100 cm, R]
 HLIM3L =  -900.0 ! h below which water uptake red. starts at low  Tpot, [-10000..100 cm, R]
 HLIM4  = -16000.0 ! No water extraction at lower pressure heads, [-16000..100 cm, R]
 RSC    =   70.0  ! Minimum canopy resistance, [0..1000 s/m, R]
 ADCRH  =    0.5  ! Level of high atmospheric demand, [0..5 cm/d, R]
 ADCRL  =    0.1  ! Level of low atmospheric demand, [0..5 cm/d, R]
*****************************************************************************


*****************************************************************************
* Section 8: Salt stress
*
  ECMAX  =    2.0 ! ECsat level at which salt stress starts, [0..20 dS/m, R]
  ECSLOP =    0.0 ! Decline of rootwater uptake above ECMAX, [0..40 %/dS/m, R]
*****************************************************************************


*****************************************************************************
* Section 9: Interception
*
 COFAB  =    0.0000001 ! Interception coefficient Von Hoyningen-Hune and Braden, [0..1 cm, R]
*****************************************************************************


*****************************************************************************
* Section 10: Root density distribution
*
* List relative root density [0..1 -, R], as function of rel. rooting depth [0..1 -, R]:
*         Rdepth Rdensity  (maximum 11 records)
  RDCTB = 0.0    1.00000
          1.0    1.00000

* End of file ***************************************************************
```

Appendix 178. Example of calendar file (*.cal) for SWAP (Pesticide L on Wick scenario)

```
************************************************************************
* Filename: MaizeS.Cal                                                 *
* Contents: SWAP 2.0 - crop calendar (max. 3 crops)                    *
************************************************************************
* Comment area:
*
************************************************************************
*
* CRPFIL    = input file with crop parameters [.CRP]
* Type      = type of crop model:
*             [simple = 1, detailed = 2, grass = 3]
* CAPFIL    = input file with scheduling criteria and parameters [.CAP]
* EMERGENCE = emergence date of the crop
* END_crop  = forced end of crop growth
* START_sch = start of irrigation scheduling period
*
************************************************************************
*
* CRPFIL Type CAPFIL  EMERGENCE  END_crop   START_sch
*                      d1 m1      d2 m2      d3 m3
 'wheat'   1    ''     12 10      24 06       01 01
* End_of_table
```

Appendix 179. Example of bottom boundary file (*.bbc) for SWAP (Pesticide L on Wick scenario)

```
*******************************************************************************
* Filename: FixLevel.BBC
* Contents: SWAP 2.0 - Bottom Boundary Condition
*******************************************************************************
* Comment area:
*
*
*******************************************************************************

* Choose one of 8 options:

  SWOPT1 = 0     ! Switch, use groundwater level, [Y=1, N=0]
*
* If SWOPT1 = 1, specify date [day month] and groundwater level [cm, neg. below
*                soil surface], maximum 366 records:
* d1 m1  GWlevel
   1  1  -100.0
  31 12  -100.0
* End of table
*******************************************************************************

  SWOPT2 = 0     ! Switch, use regional bottom flux [Y=1, N=0]
*
* If SWOPT2 = 1, specify whether a sine or a table are used to prescribe the flux:
  SWC2   = 2     ! Sine function = 1,  table = 2

* In case of sine function, specify:
  C2AVE =  0.1   ! Average value of bottom flux, [-10..10 cm/d, R, + = upwards]
  C2AMP =  0.05  ! Amplitude of bottom flux sine function, [-10..10 cm/d, R]
  C2MAX =  91    ! Daynumber with maximum bottom flux, [1..366 d, I]

* In case of table, specify date (day month) and bottom flux [cm/d, + = upwards]:
* d2 m2  Qbot  (maximum 366 records)
   1  1  0.10
   5  6  0.20
  31 12  0.10
* End of table
*******************************************************************************

  SWOPT3 = 0     ! Switch, calculate bottom flux from deep aquifer, [Y=1, N=0]
*
* If SWOPT3 = 1, specify:
  SHAPE  = 0.79  ! Shape factor to derive average groundwater level, [0..1 -, R]
  HDRAIN =-110.0 ! Mean drain base to correct for average groundwater level, [-1.E4..0 cm, R]
  RIMLAY = 500   ! Vertical resistance of aquitard, [0..10000 d, R]
  AQAVE  =-140.0 ! Average hydraulic head in underlaying aquifer, [-1000..1000 cm, R]
  AQAMP  = 20.0  ! Amplitude hydraulic head sinus wave, [0..1000 cm, R]
  AQTAMX = 120   ! First daynumber (Jan 1 = 1) with top hydraulic head, [1..366 d, I]
  AQPER  = 365   ! Period hydraulic head sinus wave, [1..366 d, I]
*******************************************************************************

  SWOPT4 = 0     ! Switch, calc. bottom flux as function of groundw. level, [Y=1, N=0]
*
* If SWOPT4 = 1, specify of q = A exp (Bh) relation:
  COFQHA =  -    ! Coefficient A, [-100..100 cm/d, R]
  COFQHB =  -    ! Coefficient B  [-1..1 /cm, R]
*******************************************************************************

  SWOPT5 = 0     ! Switch, use pressure head of bottom compartment, [Y=1, N=0]
*
* If SWOPT5 = 1, specify date [day month] and bottom compartment pressure
*                head [cm, negative if unsaturated], maximum 366 records:
* d5 m5 Hgiven
   1  1   50.0
  31 12   20.0
* End of table
*******************************************************************************

  SWOPT6 = 0     ! Switch, bottom flux equals zero, [Y=1, N=0]

  SWOPT7 = 1     ! Switch, free drainage of soil profile, [Y=1, N=0]

  SWOPT8 = 0     ! Switch, free outflow at soil-air interface, [Y=1, N=0]
```

Appendix 180. Example of soil file (*.inp) for PESTLA (Pesticide L on Wick scenario)

```
* ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
*
* PESTLA input file e:\pestla34\sensit\WICK.INP
* $Id:  e:\pestla34\sensit\WICK.INP  d.d. 1999/10/22 $
* Contents: PESTLA 3.4 - Soil input data
*
* ------------------------------------------------------------------------
*
* Section 1: Soil physical parameters needed for solute transport
* ------------------------------------------------------------------------
*
* NUmber of soil HOrizons
* (defined in hydrological simulations, here only used to check consistency)
NUHOHV = 4                    ! unit: -          range: 1 .. 6
*
* Array with dry Bulk Density
* (length of array equals NUHO)
BD = 1.350000 1.450000 1.410000 1.530000 ! unit: kg/L       range: 0.5 .. 2.0
*
* SWitch for calculation of LEngth of DiSpersion in LIquid phase
* ( 0 = user-defined, 1 = controlled by compartment thickness)
SWLEDSLI = 0                  ! unit: -          range: 0 .. 1
*
* Table with LEngths of DiSpersion in LIquid phase (only if SWLEDSLI = 0)
* array length equals NUHO
LEDSLI = .0500000 .0500000 .0500000 .0500000    ! unit: m          range: 0.0 .. 1.0
*
* ------------------------------------------------------------------------
*
* Section 2: tortuosity factors for diffusion in liquid and gas phases
* ------------------------------------------------------------------------
*
* All coefficients and exponents  are a function of the horizon and
*   are given as arrays with length NUHO
*
* ------------------------------------------------------------------------
*
* Section 2.1: Liquid phase
* ------------------------------------------------------------------------
*
* SWitch for choice between TortUosity relations for LIquid phase of
*   Millington & Quirk , Currie et al. and Troeh et al.
*   1 = Millington & Quirk (1960)
*   2 = Currie et al. (1965)
*   3 = Troeh et al. (1982)
* If SWTULI = 1, parameter values are fixed and must not be entered
SWTULI = 1                    ! unit: -          range: 1 .. 3
* ------------------------------------------------------------------------
*
* Section 2.2: Gas phase
* ------------------------------------------------------------------------
*
* SWitch for choice between TortUosity relations for GAs phase of
*   Millington & Quirk , Currie et al. and Troeh et al.
*   1 = Millington & Quirk (1960)
*   2 = Currie et al. (1965)
*   3 = Troeh et al. (1982)
* If SWTUGA = 1, parameter values are fixed and must not be entered
SWTUGA = 1                    ! unit: -          range: 1 .. 3
* ------------------------------------------------------------------------
*
* Section 3: Parameter for boundary layer diffusion at the soil surface
* ------------------------------------------------------------------------
*
* THickness of the stagnant AIr LAyer at soil surface
THAILA = .0100000                ! unit: m          range: 1.0E-6 .. 1.
*
* ------------------------------------------------------------------------
*
* Section 4: Depth dependencies of sorption and conversion properties
* ------------------------------------------------------------------------
*
* ConTent of Organic Matter as a function of soil layer
*   (array with length NUHO)
```

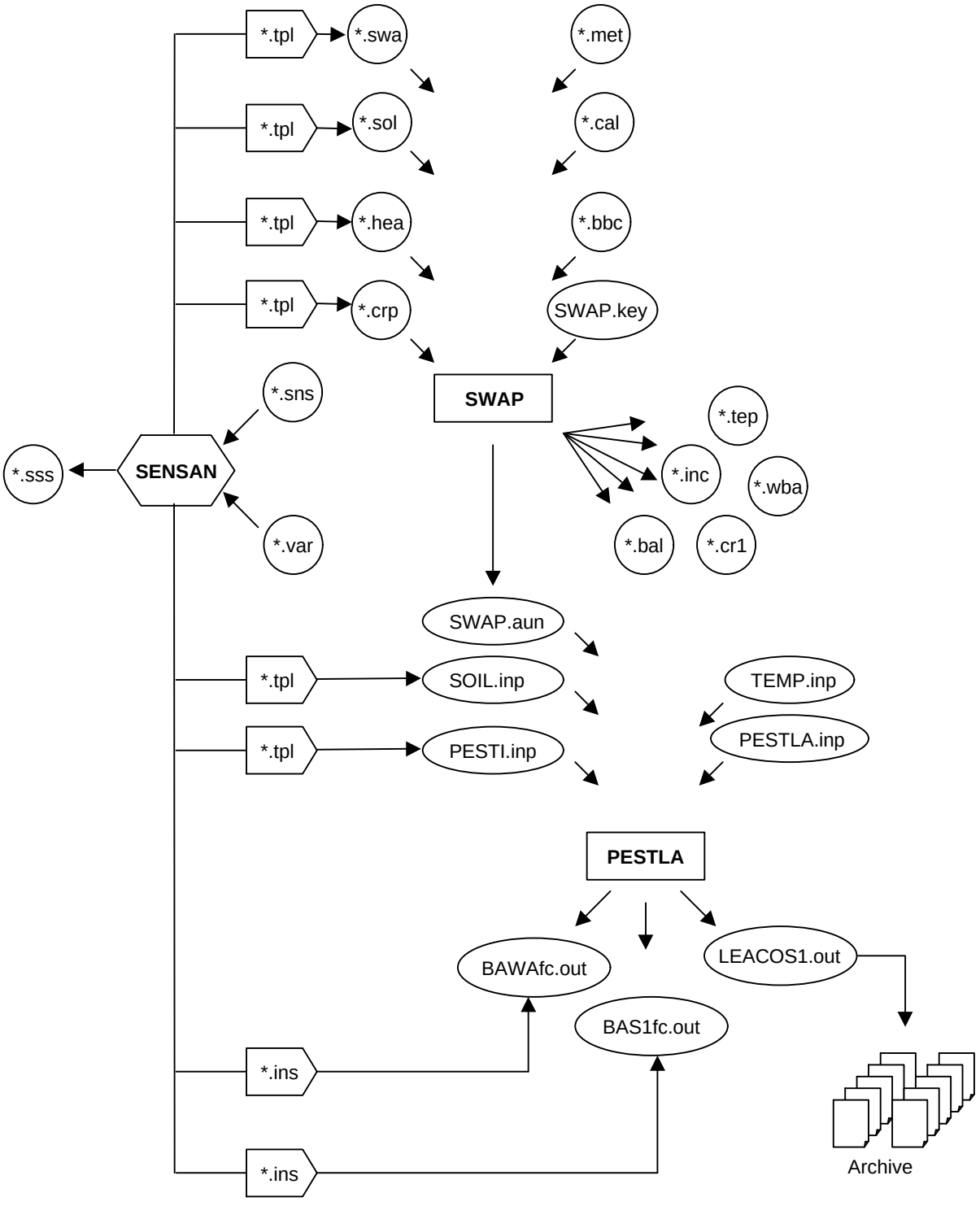
```
CTOM = .0292000  .0138000  .0052000  .0034000   ! unit: kg/kg      range: 0.0 .. 1.0
*
* FActor for the influence of DePth on ConVersion rate in soil as
*   a function of soil layer (array with length NUHO)
FACVDP =       1.     0.56     0.30     0.24       ! unit: -          range: 0.0 .. 10.0
*
* ------------------------------------------------------------------------
*
* Section 5: Ploughing
* ------------------------------------------------------------------------
*
NUPL = 0                       ! unit: -          range: 0 .. 100
*
* SWitch for TIme of PLoughing
* ( 1 = ploughing takes place at indicated combination of YRPL and TIYRPL
*   2 = ploughing is repeated at the indicated TIYRPL each year)
SWTIPL = 1                     ! unit: -          range: 1 .. 2
*
* ------------------------------End of File-----------------------------
```

Appendix 181. Example of pesticide file (*.inp) for PESTLA (Pesticide L on Wick scenario)

```
* ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
*
* PESTLA input file e:\pestla34\sensit\L.INP
* $Id:  e:\pestla34\sensit\L.INP  d.d. 1999/10/22 $
* Contents: PESTLA 3.4 - Substance input data
*
* ------------------------------------------------------------------------
*
* Section 1: Substance properties
* ------------------------------------------------------------------------
*
* SUbstance NAme
SUNA = 'L'                 ! unit: -          range: 0 .. 12 characters
*
* SUbstance Molar Mass
SUMM = 200.                    ! unit: g/mol      range: 1. .. 1000.
*
* CoeFficient of DiFfusion of the SUbstance in WAter
CFDFSUWA = 3.970e-5            ! unit: m2/d       range: 1.0E-5 .. 0.0001
*
* CoeFficient of DiFfusion of the SUbstance in AIr
CFDFSUAI = .4303000              ! unit: m2/d       range: 0.1 .. 3.
*
* WAter SoLubility of SUbstance: mass concentration in water at
*   saturation measured at reference temperature TERFSL
WASLSU = 500.                  ! unit: mg/L       range: 1.0E-9 .. 1000000.
*
* TEmperature of ReFerence at which the water SoLubility was measured
TERFSL = 20.                   ! unit: deg. Celsius range: 0. .. 100.
*
* molar ENthalpy of the disSoLution process (describing the relation
*   between the water solubility of the substance and temperature)
ENSL = 40000.00                ! unit: J/mol      range: -200000. .. 200000.
*
* SAturated VaPour pressure of SUbstance measured at temperature TERFVP
SAVPSU = .0030000                ! unit: Pa         range: 0. .. 200000.
*
* TEmperature of ReFerence at which the saturated VaPour pressure was measured
TERFVP = 20.                   ! unit: deg. Celsius range: 0. .. 100.
*
* molar ENthalpy of the VaPorization process (describing the relation
*   between the saturated vapour pressure of the substance and temperature)
ENVP = 100000.0                ! unit: J/mol      range: 0. .. 200000.
*
* ------------------------------------------------------------------------
*
* Section 2: Plant Uptake Parameter
* ------------------------------------------------------------------------
*
* CoeFficient for UPtake by plants (due to TRanspiration)
CFUPTR = .5000000                ! unit: -          range: 0. .. 5.
*
* ------------------------------------------------------------------------
*
* Section 3: Conversion in Soil
* ------------------------------------------------------------------------
*
* SWitch for including/excluding conversion process
* ( 0 = no conversion, 1 = conversion characterized by half-life)
SWCV = 1                       ! unit: -          range: 0 .. 1
*
* Half-Life of ConVersion at ReFerence conditions (20 degrees Celsius
*   and matric pressure of -100 hPa)
HLCVRF = 7.762000                ! unit: d          range: 1. .. 100000.
*
* molar activation EnerGy of ConVersion: parameter in Arrhenius
*    equation describing the relation between
*    the conversion rate of the substance and soil temperature
EGCV = 55000.00                ! unit: J/mol      range: 0. .. 200000.
*
* CoeFficient describing the relation between the ConVersion rate of the substance
*    and the volume fraction of LIquid
CFLICV = .7000000                ! unit: -          range: 0. .. 5.
*
```

```
* ----------------------------------------------------------------------
*
* Section 4: Formation parameter
* ----------------------------------------------------------------------
*
* FRaction (on amount-of-substance basis) of product ForMed out
*   of its precursor
FRFM = 0.                      ! unit: -          range: 0. .. 1.
* not relevant and not needed for first (applied) compound
*
* ----------------------------------------------------------------------
*
* Section 5: Sorption properties
* ----------------------------------------------------------------------
*
* ----------------------------------------------------------------------
*
* Section 5.1: switch for inclusion/exclusion of sorption process
* ----------------------------------------------------------------------
*
* SWitch for including/excluding SorPtion process
*   (0 = no sorption, 1 = Freundlich sorption)
SWSP = 1                       ! unit: -          range: 0 .. 1
*
* ----------------------------------------------------------------------
*
* Section 5.2: Parameters for equilibrium sorption
* ----------------------------------------------------------------------
*
* CoeFficient of SorPtion of substance on Organic Matter
* basis (Kom) for EQuilibrium sorption
CFSPOMEQ = 11.62800              ! unit: L/kg       range: 0. .. 1000000000.
*
* FreundlicH EXponent for EQuilibrium sorption
FHEXEQ = .9000000                  ! unit: -          range: 0.01 .. 1.3
*
* ----------------------------------------------------------------------
*
* Section 5.3: Inclusion/exclusion of Non-Equilibrium sorption
* ----------------------------------------------------------------------
*
* SWitch for including/excluding Non-Equilibrium sorption
*   (0 = no Non-Eq. sorption, 1 = Non-Eq. sorption)
SWNE = 0                       ! unit: -          range: 0 .. 1
*
* ----------------------------------------------------------------------
*
* Section 5.4: Parameter for temperature influence on sorption coefficients
* ----------------------------------------------------------------------
*
* molar ENthalpy of the SorPtion process (describing the relation
*   between the equilibrium and non-equilibrium sorption coefficients
*   and temperature assuming a reference temperature
*   of 20 degrees Celsius)
ENSP = 0.                      ! unit: J/mol      range: -200000. .. 200000.
*
* ----------------------------------------------------------------------
*
* Section 6: Initial conditions for the substance
* ----------------------------------------------------------------------
*
* COncentration in the Soil System
* array with NUCP values)
* NUCP is defined as NUmber of ComPartments in hydrological model)
COSS =        0.        0.        0.        0.        0.        0.        0.        0.
0.
       0.        0.        0.        0.        0.        0.        0.        0.
       0.        0.        0.        0.        0.        0.        0.        0.
       0.        0.        0.        0.        0.        0.        0.        0.
       0.        0.        0.        0.        0.        0.        0. ! unit: mg/L range: 0.0
.. 1.0E4
*
* ConTent SorBed at Non-Equilibrium site (array with NUCP values)
CTSBNE =        0.        0.        0.        0.        0.        0.        0.        0.
0.
       0.        0.        0.        0.        0.        0.        0.        0.
       0.        0.        0.        0.        0.        0.        0.        0.
```

```
      0.        0.        0.        0.        0.        0.        0.        0.
      0.        0.        0.        0.        0.        0.        0. ! unit: mg/kg range: 0.0
.. COSS/BD
*
* ----------------------------------------------------------------------
*
* Section 7: Inputs for the substance via water entering the soil system
* ----------------------------------------------------------------------
*
* COncentration of substance in LIquid phase entering the soil
* via lateral infiltration (e.g. via drains)
COWADR = 0.                    ! unit: mg/L       range: 0. .. 10000.
*
* COncentration of substance in LIquid phase entering the soil at the BoTtom
*   of the system (via capillary rise)
COLIBT = 0.                    ! unit: mg/L       range: 0. .. 10000.
*
* ----------------------------------------------------------------------
*
* Section 8: Additions to the soil system
* ----------------------------------------------------------------------
*
NUAD = 1                       ! unit: -          range: 0 .. 100
*
* SWitch for TIme of ADdition
* ( 1 = addition takes place at indicated combination of YRAD and TIYRAD
*   2 = addition is repeated at the indicated TIYRAD each year)
SWTIAD = 1                     ! unit: -          range: 1 .. 2
*
* YRAD:   YeaR of ADdition event
* TIYRAD: TIme within YeaR of ADdition event
* AMAD:   Amount of Addition
* DPTPAD: DePth of the ToP of the layer to which addition takes place
* DPBTAD: DePth of the Bottom of the layer to which addition takes place
*  (table with addition information not needed if NUAD = 0;
*   length of table equals NUAD)
    YRAD TIYRAD    AMAD    DPTPAD    DPBTAD
    1985 305.      2.        0.        0.
!YRAD       unit: -          range: YRMI .. YRMA
!TIYRAD     unit: d          range: 0.0 .. 366.0
!AMAD       unit: kg/ha      range: 0.0 .. 1000
!DPTPAD     unit: m          range: 0.0 .. 1.0
!DPBTAD     unit: m          range: DPTPAD .. 1.0
*
* ----------------------------------------------------------------------
*
* Section 9: User interface switches, not used in the PESTLA model
* ----------------------------------------------------------------------
*
* SWitch for ADdition type
*   SWAD = 1 : spraying onto soil surface,
*   SWAD = 2 : incorporation into the soil
*   SWAD = 3 : injection into the soil
SWAD = 1                       ! unit: -          range: 1 .. 3
*
* ------------------------------End of File-----------------------------
```



Appendix 182. Flow chart explaining the combination of SWAP/PESTLA and SENSAN

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

Appendix 183. List of PESTLA parameters included in the sensitivity analyses

	Initial value	Absolute values		Perc. of variation		Multiplication factor	
		Min	Max	Min	Max	Min	Max
G1	0.1048	0.09432	0.11528	-10	10	0.9	1.1
G2	0.4602	0.41418	0.50622	-10	10	0.9	1.1
G3	288	72	1152	-75	300	0.25	4
G4	0.0728	0.06916	0.07644	-5	5	0.95	1.05
G6	1.4508	1.37826	1.52334	-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	50	0.5	1.5
PSA	0.57	0.513	0.627	-10	10	0.9	1.1
PSI	0.33	0.297	0.363	-10	10	0.9	1.1
PCL	0.1	0.09	0.11	-10	10	0.9	1.1
ORG	0.0292	0.02577	0.03263	-11.76	11.76	0.88	1.12
RDS	80	60	100	-25	25	0.75	1.25
HI	-50	-71	-37	42	-26	1.42	0.74
TEMI	8	6	10	-25	25	0.75	1.25
IF	0.6	0.3	1.2	-50	100	0.5	2
IR	0.75	0.375	1.5	-50	100	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	25	0.75	1.25
RDD	1	0.75	1	-25	0	0.75	1
BD	1.35	1.215	1.485	-10	10	0.9	1.1
LEDS	0.05	0.002	0.1	-96	100	0.04	2
THAI	0.01	0.001	0.1	-90	900	0.1	10
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	100	0.5	2
ENSL	40000	20000	80000	-50	100	0.5	2
SAVP	0.003	0.0003	0.03	-90	900	0.1	10
ENVP	100000	50000	200000	-50	100	0.5	2
CFUP	0.5	0	1	-100	100	0	2
DEG	7.762	3.881	15.524	-50	100	0.5	2
EGCV	55000	20000	100000	-63.64	81.82	0.36	1.82
CFLI	0.7	0.42	0.98	-40	40	0.6	1.4
KOM	11.628	5.814	23.256	-50	100	0.5	2
FREU	0.9	0.72	1.08	-20	20	0.8	1.2

Appendix 184. Variation attributed to PESTLA input parameters for the one-at-a-time sensitivity analysis *Pesticide L on Wick* scenario

	Initial value	Absolute values Min	Absolute values Max	Perc. of variation Min	Perc. of variation Max	Multiplication factor Min	Multiplication factor Max
G1	0.1048	0.09432	0.11528	-10	10	0.9	1.1
G2	0.4602	0.41418	0.50622	-10	10	0.9	1.1
G3	288	72	1152	-75	300	0.25	4
G4	0.0728	0.06916	0.07644	-5	5	0.95	1.05
G6	1.4508	1.37826	1.52334	-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	50	0.5	1.5
PSA	0.57	0.513	0.627	-10	10	0.9	1.1
PSI	0.33	0.297	0.363	-10	10	0.9	1.1
PCL	0.1	0.09	0.11	-10	10	0.9	1.1
ORG	0.0292	0.02577	0.03263	-11.76	11.76	0.88	1.12
RDS	80	60	100	-25	25	0.75	1.25
HI	-50	-71	-37	42	-26	1.42	0.74
TEMI	8	6	10	-25	25	0.75	1.25
IF	0.6	0.3	1.2	-50	100	0.5	2
IR	0.75	0.375	1.5	-50	100	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	25	0.75	1.25
RDD	1	0.75	1	-25	0	0.75	1
BD	1.35	1.215	1.485	-10	10	0.9	1.1
LEDS	0.05	0.002	0.1	-96	100	0.04	2
THAI	0.01	0.001	0.1	-90	900	0.1	10
SUWA	3.97E-05	8.61E-06	8.63E-05	-78.30	117.40	0.22	2.17
SUAI	0.4303	0.21515	0.8606	-50	100	0.5	2
ENSL	40000	20000	80000	-50	100	0.5	2
SAVP	3E-08	3E-09	3E-07	-90	900	0.1	10
ENVP	100000	50000	200000	-50	100	0.5	2
CFUP	0.5	0	1	-100	100	0	2
DEG	23.26	11.63	46.52	-50	100	0.5	2
EGCV	55000	20000	100000	-63.64	81.82	0.36	1.82
CFLI	0.7	0.42	0.98	-40	40	0.6	1.4
KOM	58.14	29.07	116.28	-50	100	0.5	2
FREU	0.9	0.72	1.08	-20	20	0.8	1.2

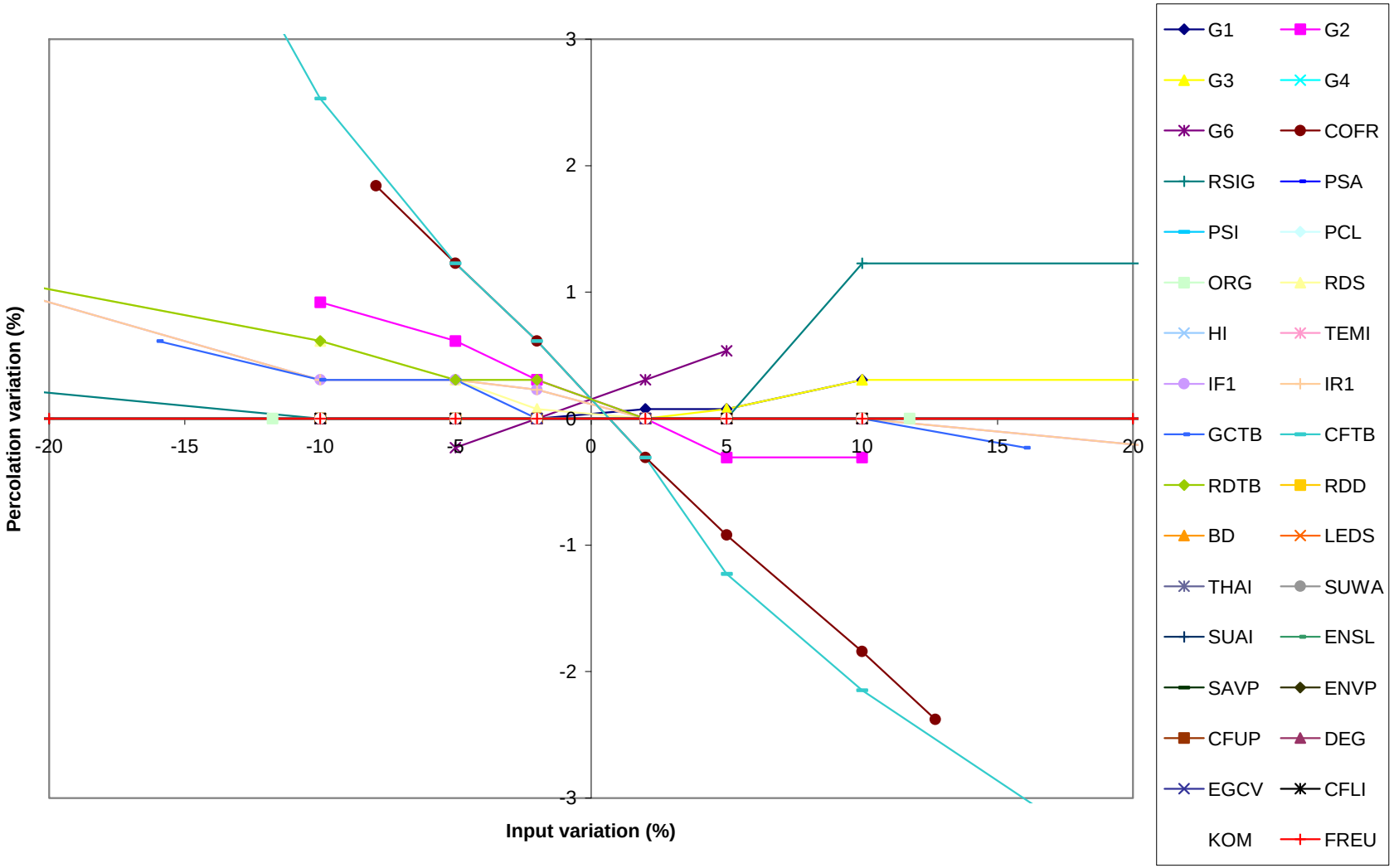
Appendix 185. Variation attributed to PESTLA input parameters for the one-at-a-time sensitivity analysis *Pesticide T on Wick* scenario

	Initial value	Absolute values Min	Absolute values Max	Perc. of variation Min	Perc. of variation Max	Multiplication factor Min	Multiplication factor Max
G1	0.0012	0.00108	0.00132	-10	10	0.9	1.1
G2	0.4476	0.40284	0.49236	-10	10	0.9	1.1
G3	98.12	24.53	392.48	-75	300	0.25	4
G4	0.0526	0.04997	0.05523	-5	5	0.95	1.05
G6	1.1395	1.08252	1.19647	-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	50	0.5	1.5
PSA	0.33	0.297	0.363	-10	10	0.9	1.1
PSI	0.48	0.432	0.528	-10	10	0.9	1.1
PCL	0.19	0.171	0.209	-10	10	0.9	1.1
ORG	0.0198	0.01747	0.02213	-11.76	11.76	0.88	1.12
RDS	80	60	100	-25	25	0.75	1.25
HI	-50	-141	-13.5	182	-73	2.82	0.27
TEMI	8	6	10	-25	25	0.75	1.25
IF	0.6	0.3	1.2	-50	100	0.5	2
IR	0.75	0.375	1.5	-50	100	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	25	0.75	1.25
RDD	1	0.75	1	-25	0	0.75	1
BD	1.39	1.251	1.529	-10	10	0.9	1.1
LEDS	0.05	0.002	0.1	-96	100	0.04	2
THAI	0.01	0.001	0.1	-90	900	0.1	10
SUWA	3.97E-05	8.61E-06	8.63E-05	-78.30	117.40	0.22	2.17
SUAI	0.4303	0.21515	0.8606	-50	100	0.5	2
ENSL	40000	20000	80000	-50	100	0.5	2
SAVP	0.003	0.0003	0.03	-90	900	0.1	10
ENVP	100000	50000	200000	-50	100	0.5	2
CFUP	0.5	0	1	-100	100	0	2
DEG	7.762	3.881	15.524	-50	100	0.5	2
EGCV	55000	20000	100000	-63.64	81.82	0.36	1.82
CFLI	0.7	0.42	0.98	-40	40	0.6	1.4
KOM	11.628	5.814	23.256	-50	100	0.5	2
FREU	0.9	0.72	1.08	-20	20	0.8	1.2

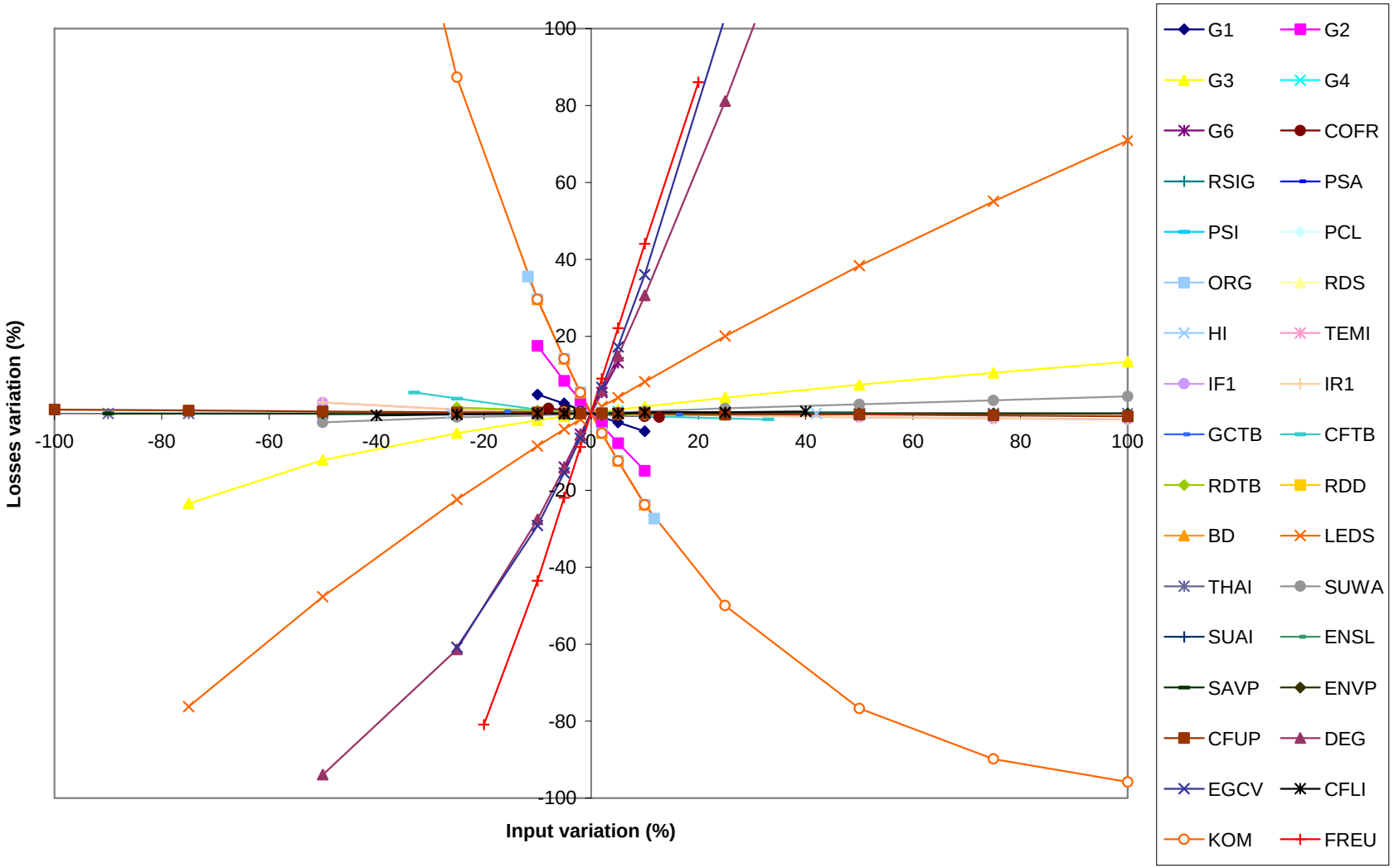
Appendix 186. Variation attributed to PESTLA input parameters for the one-at-a-time sensitivity analysis *Pesticide L on Hodnet* scenario

	Initial value	Absolute values Min	Absolute values Max	Perc. of variation Min	Perc. of variation Max	Multiplication factor Min	Multiplication factor Max
G1	0.0012	0.00108	0.00132	-10	10	0.9	1.1
G2	0.4476	0.40284	0.49236	-10	10	0.9	1.1
G3	98.12	24.53	392.48	-75	300	0.25	4
G4	0.0526	0.04997	0.05523	-5	5	0.95	1.05
G6	1.1395	1.08252	1.19647	-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	50	0.5	1.5
PSA	0.33	0.297	0.363	-10	10	0.9	1.1
PSI	0.48	0.432	0.528	-10	10	0.9	1.1
PCL	0.19	0.171	0.209	-10	10	0.9	1.1
ORG	0.0198	0.01747	0.02213	-11.76	11.76	0.88	1.12
RDS	80	60	100	-25	25	0.75	1.25
HI	-50	-141	-13.5	182	-73	2.82	0.27
TEMI	8	6	10	-25	25	0.75	1.25
IF	0.6	0.3	1.2	-50	100	0.5	2
IR	0.75	0.375	1.5	-50	100	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	25	0.75	1.25
RDD	1	0.75	1	-25	0	0.75	1
BD	1.39	1.251	1.529	-10	10	0.9	1.1
LEDS	0.05	0.002	0.1	-96	100	0.04	2
THAI	0.01	0.001	0.1	-90	900	0.1	10
SUWA	3.97E-05	8.61E-06	8.63E-05	-78.30	117.40	0.22	2.17
SUAI	0.4303	0.21515	0.8606	-50	100	0.5	2
ENSL	40000	20000	80000	-50	100	0.5	2
SAVP	3E-08	3E-09	3E-07	-90	900	0.1	10
ENVP	100000	50000	200000	-50	100	0.5	2
CFUP	0.5	0	1	-100	100	0	2
DEG	23.26	11.63	46.52	-50	100	0.5	2
EGCV	55000	20000	100000	-63.64	81.82	0.36	1.82
CFLI	0.7	0.42	0.98	-40	40	0.6	1.4
KOM	58.14	29.07	116.28	-50	100	0.5	2
FREU	0.9	0.72	1.08	-20	20	0.8	1.2

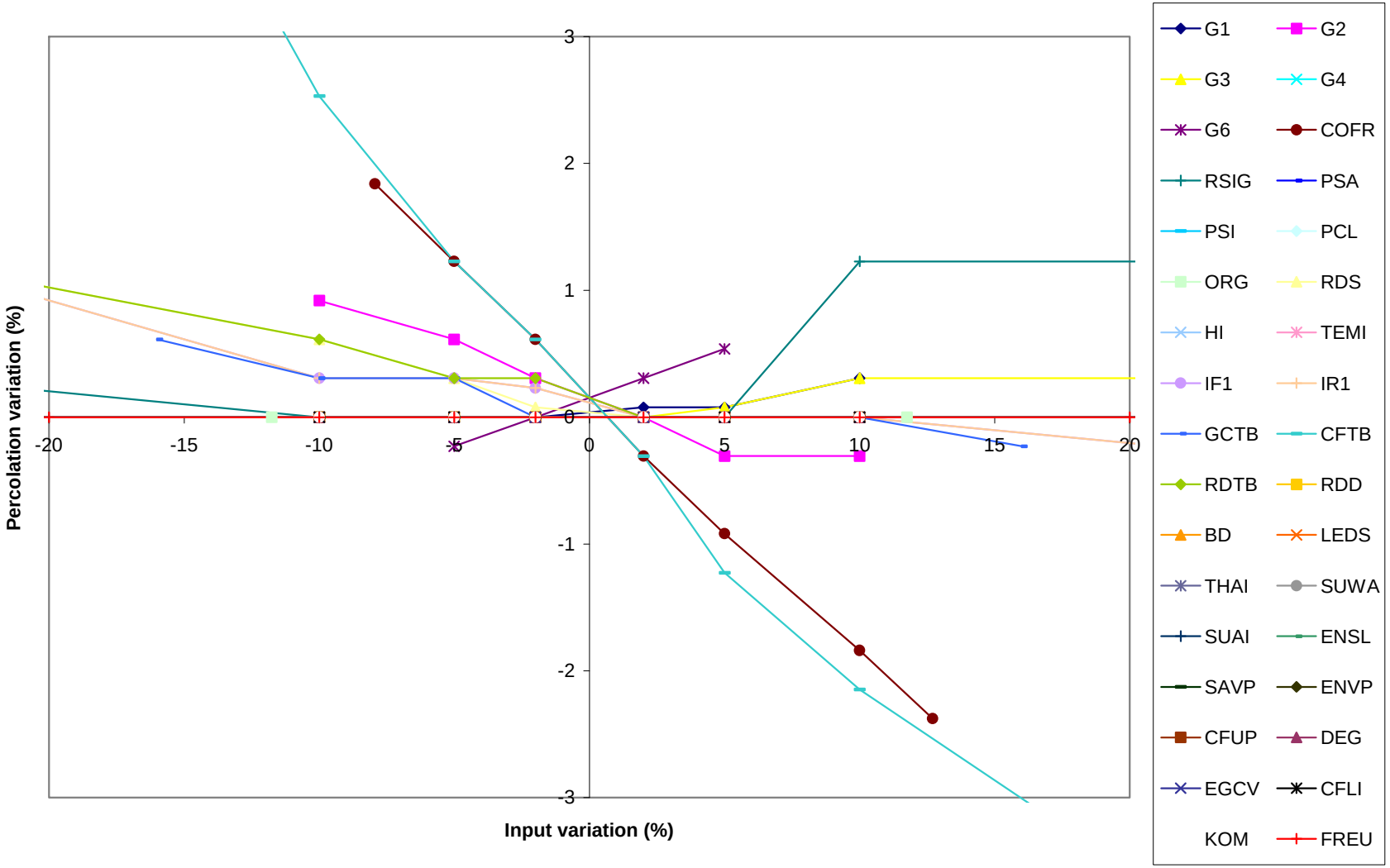
Appendix 187. Variation attributed to PESTLA input parameters for the one-at-a-time sensitivity analysis *Pesticide T on Hodnet* scenario



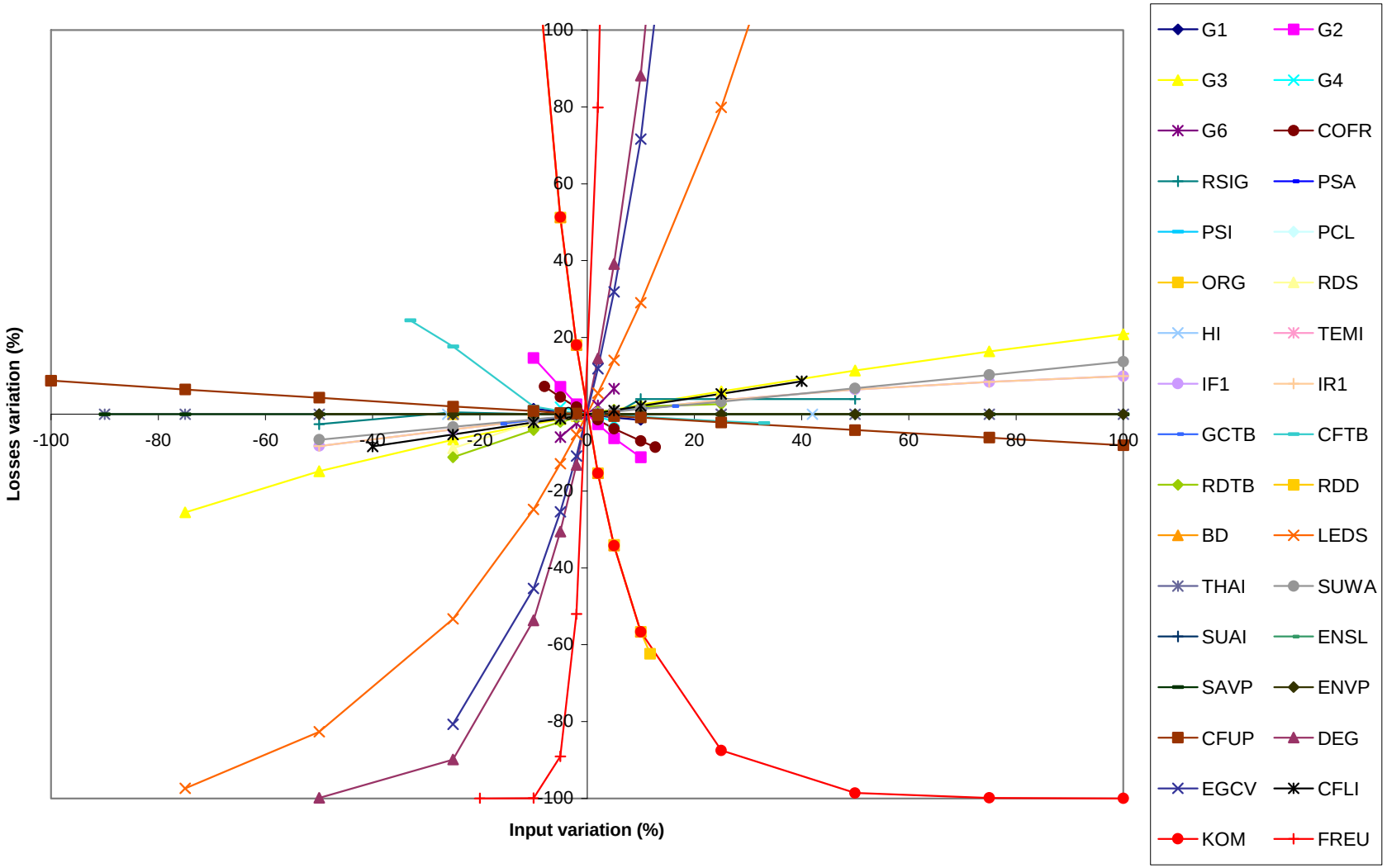
Appendix 188. Influence of the variation of input parameters on percolation predicted by PESTLA – *Pesticide L on Wick* scenario
The closer the curve to the Y-axis, the more influence the parameter has.



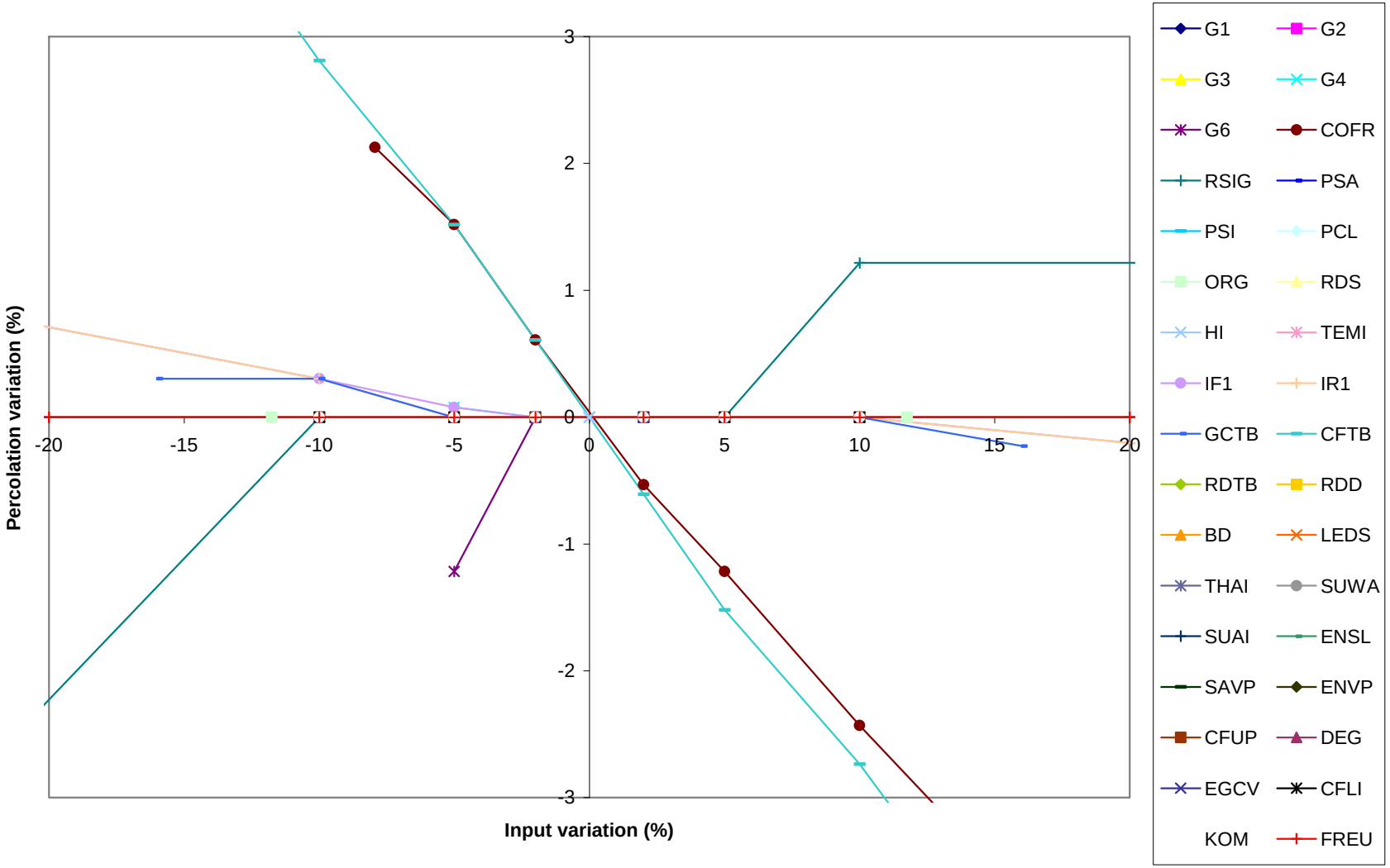
Appendix 189. Influence of the variation of input parameters on pesticide losses predicted by PESTLA – *Pesticide L on Wick* scenario
The closer the curve to the Y-axis, the more influence the parameter has.



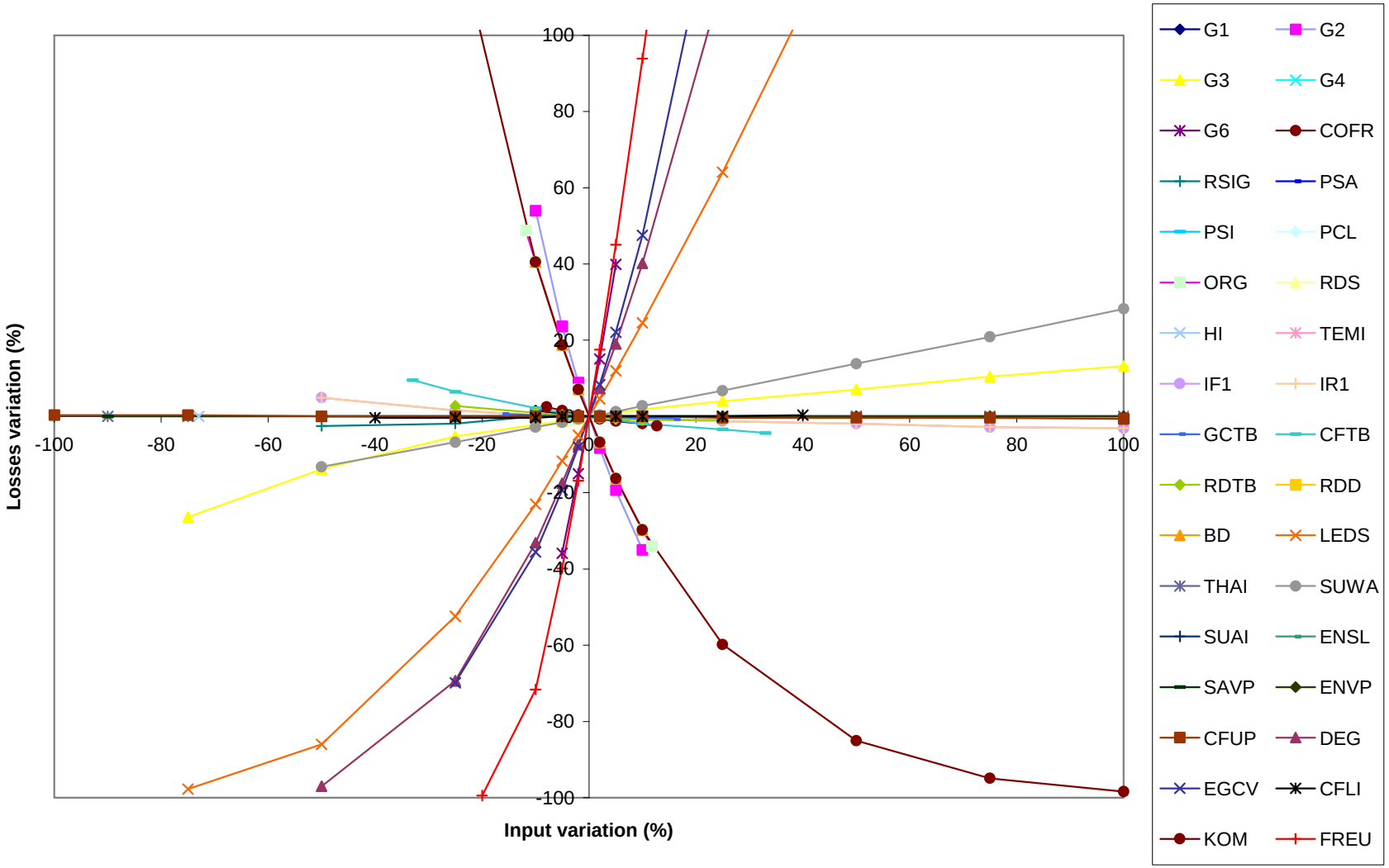
Appendix 190. Influence of the variation of input parameters on percolation predicted by PESTLA – *Pesticide T on Wick* scenario
The closer the curve to the Y-axis, the more influence the parameter has.



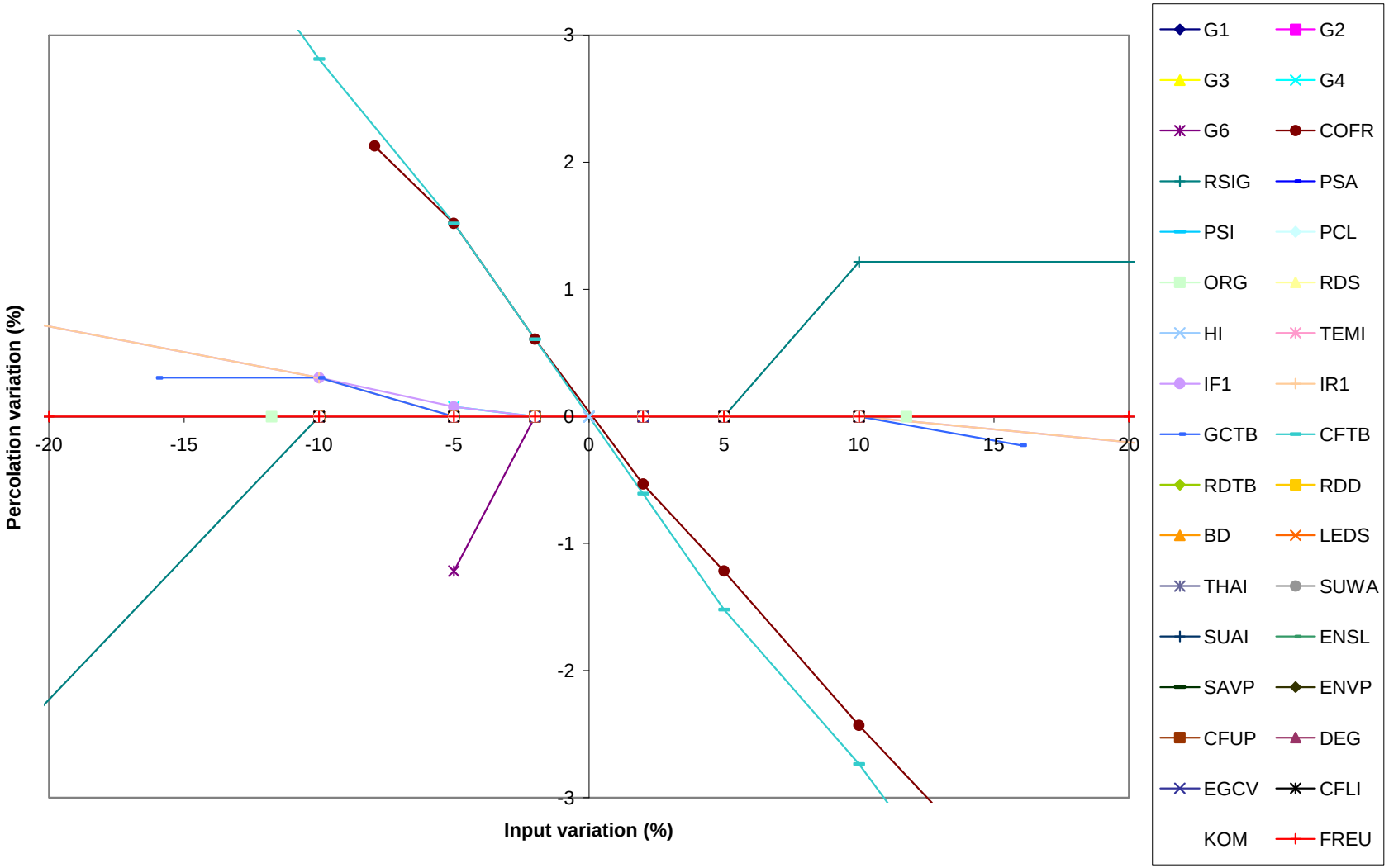
Appendix 191. Influence of the variation of input parameters on pesticide losses predicted by PESTLA – *Pesticide T on Wick* scenario
The closer the curve to the Y-axis, the more influence the parameter has.



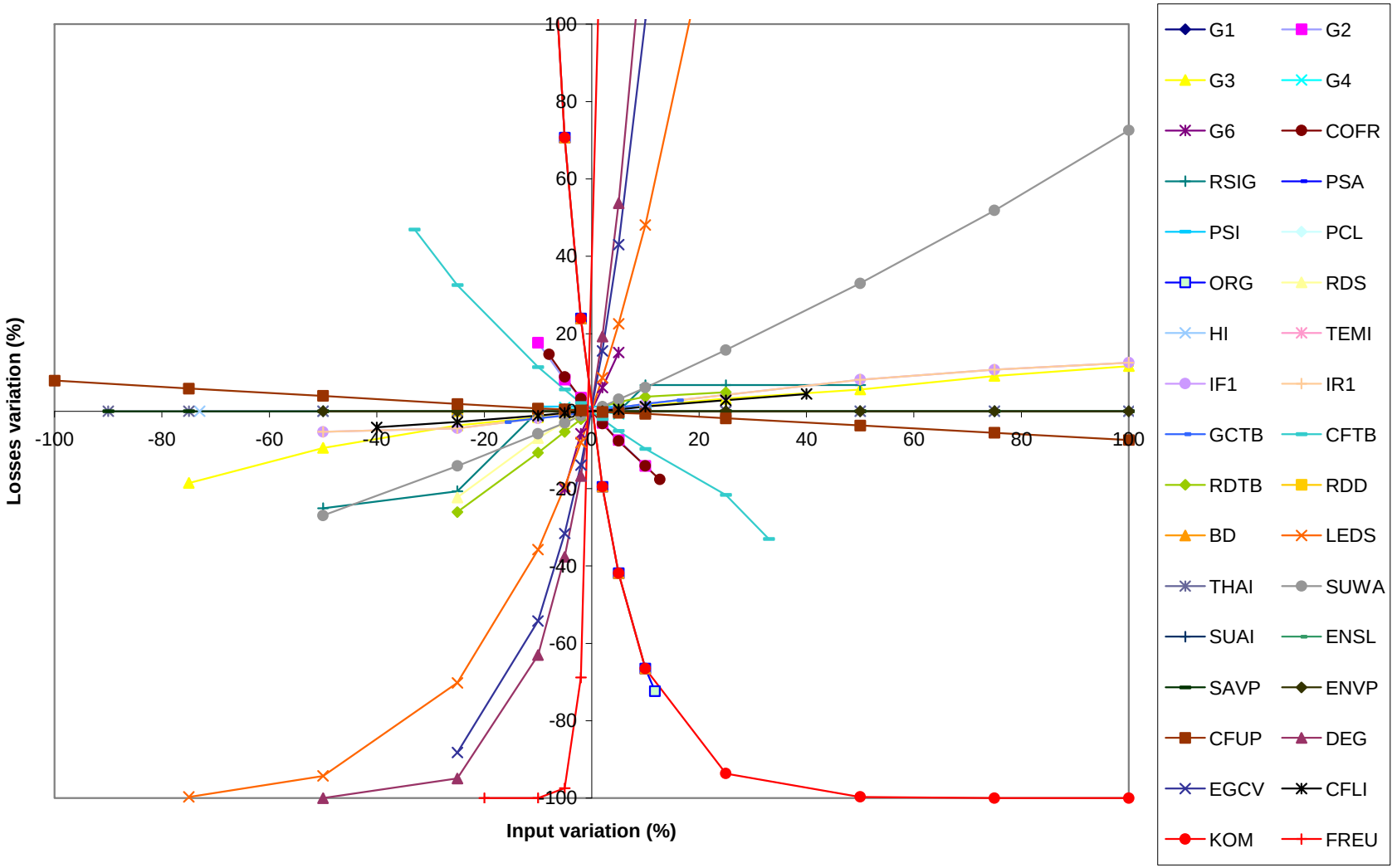
Appendix 192. Influence of the variation of input parameters on percolation predicted by PESTLA – *Pesticide L on Hodnet* scenario
The closer the curve to the Y-axis, the more influence the parameter has.



Appendix 193. Influence of the variation of input parameters on pesticide losses predicted by PESTLA – *Pesticide L on Hodnet* scenario
The closer the curve to the Y-axis, the more influence the parameter has.



Appendix 194. Influence of the variation of input parameters on percolation predicted by PESTLA – *Pesticide T on Hodnet* scenario
The closer the curve to the Y-axis, the more influence the parameter has.



Appendix 195. Influence of the variation of input parameters on pesticide losses predicted by PESTLA – *Pesticide T on Hodnet* scenario
The closer the curve to the Y-axis, the more influence the parameter has.

	Parameter	Description	MAROV	Influence
1	CFTB	Crop factor	0.331	-
2	COFR	Soil evaporation coefficient of Blak and Boesten or Boesten/Stroosnijder	0.307	-
3	G2	Saturated moisture content	0.153	-
4	G6	Parameter n	0.153	+
5	RDTB	maximum rooting depth	0.153	-
6	RSIG	Minimum rainfall to reset models	0.123	+/-
7	IF1	Extinction coefficient for diffuse visible light	0.115	-
8	IR1	Extinction coefficient for direct visible light	0.115	-
9	RDS	maximum rooting depth allowed by soil profile	0.061	-
10	GCTB	Maximum leaf area index	0.061	-
11	G1	Residual moisture content	0.038	+
12	G3	Saturated hydraulic conductivity	0.031	+
13	G4	Alpha main drying curve	0	
14	PSA	sand content	0	
15	PSI	silt content	0	
16	PCL	clay content	0	
17	ORG	organic matter content	0	
18	HI	initial pressure heads	0	
19	TEMI	initial soil temperatures	0	
20	RDD	Root density distribution	0	
21	BD	Bulk density	0	
22	LEDS	Lengths of dispersion in liquid phase	0	
23	THAI	Thickness of the stagnant air layer at soil surface	0	
24	SUWA	Coefficient of diffusion in water	0	
25	SUAI	Coefficient of diffusion in air	0	
26	ENSL	Molar enthalpy of the dissolution process	0	
27	SAVP	Saturated vapour pressure	0	
28	ENVP	Molar enthalpy of the vaporisation process	0	
29	CFUP	Coefficient of uptake by plants	0	
30	DEG	Degradation rates	0	
31	EGCV	Molar activation energy of degradation	0	
32	CFLI	Coefficient describing the relationship between the conversion rate and the volume fraction of liquid	0	
33	KOM	Kom	0	
34	FREU	Freundlich exponent	0	

Appendix 196. Classification of PESTLA input parameters according to their influence on percolation results for the *Pesticide L on Wick* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in recharge.

	Parameter	Description	MAROV	Influence
1	KOM	Kom	4.6	-
2	FREU	Freundlich exponent	4.5	+
3	EGCV	Molar activation energy of degradation	4.1	+
4	DEG	Degradation rates	3.8	+
5	ORG	organic matter content	3.0	-
6	BD	Bulk density	3.0	-
7	G6	Parameter n	2.8	+
8	G2	Saturated moisture content	1.8	-
9	LEDS	Lengths of dispersion in liquid phase	1.0	+
10	G1	Residual moisture content	0.515	-
11	G3	Saturated hydraulic conductivity	0.313	+
12	CFTB	Crop factor	0.164	-
13	COFR	Soil evaporation coefficient of Blak and Boesten or Boesten/Stroosnijder	0.162	-
14	G4	Alpha main drying curve	0.129	+
15	RDTB	maximum rooting depth	0.129	-
16	SUWA	Coefficient of diffusion in water	0.129	+
17	IF1	Extinction coefficient for diffuse visible light	0.057	-
18	IR1	Extinction coefficient for direct visible light	0.057	-
19	RDS	maximum rooting depth allowed by soil profile	0.052	-
20	GCTB	Maximum leaf area index	0.052	-
21	RSIG	Minimum rainfall to reset models	0.026	+
22	CFUP	Coefficient of uptake by plants	0.026	-
23	CFLI	Coefficient describing the relationship between the conversion rate and the volume fraction of liquid	0.026	+
24	PSA	sand content	0	
25	PSI	silt content	0	
26	PCL	clay content	0	
27	HI	initial pressure heads	0	
28	TEMI	initial soil temperatures	0	
29	RDD	Root density distribution	0	
30	THAI	Thickness of the stagnant air layer at soil surface	0	
31	SUAI	Coefficient of diffusion in air	0	
32	ENSL	Molar enthalpy of the dissolution process	0	
33	SAVP	Saturated vapour pressure	0	
34	ENVP	Molar enthalpy of the vaporisation process	0	

Appendix 197. Classification of PESTLA input parameters according to their influence on pesticide losses for the *Pesticide L on Wick* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in pesticide losses

	Parameter	Description	MAROV	Influence
1	CFTB	Crop factor	0.331	-
2	COFR	Soil evaporation coefficient of Blak and Boesten or Boesten/Stroosnijder	0.307	-
3	G2	Saturated moisture content	0.153	-
4	G6	Parameter n	0.153	+
5	RDTB	maximum rooting depth	0.153	-
6	RSIG	Minimum rainfall to reset models	0.123	+/-
7	IF1	Extinction coefficient for diffuse visible light	0.115	-
8	IR1	Extinction coefficient for direct visible light	0.115	-
9	RDS	maximum rooting depth allowed by soil profile	0.061	-
10	GCTB	Maximum leaf area index	0.061	-
11	G1	Residual moisture content	0.038	+
12	G3	Saturated hydraulic conductivity	0.031	+
13	G4	Alpha main drying curve	0	
14	PSA	sand content	0	
15	PSI	silt content	0	
16	PCL	clay content	0	
17	ORG	organic matter content	0	
18	HI	initial pressure heads	0	
19	TEMI	initial soil temperatures	0	
20	RDD	Root density distribution	0	
21	BD	Bulk density	0	
22	LEDS	Lengths of dispersion in liquid phase	0	
23	THAI	Thickness of the stagnant air layer at soil surface	0	
24	SUWA	Coefficient of diffusion in water	0	
25	SUAI	Coefficient of diffusion in air	0	
26	ENSL	Molar enthalpy of the dissolution process	0	
27	SAVP	Saturated vapour pressure	0	
28	ENVP	Molar enthalpy of the vaporisation process	0	
29	CFUP	Coefficient of uptake by plants	0	
30	DEG	Degradation rates	0	
31	EGCV	Molar activation energy of degradation	0	
32	CFLI	Coefficient describing the relationship between the conversion rate and the volume fraction of liquid	0	
33	KOM	Kom	0	
34	FREU	Freundlich exponent	0	

Appendix 198. Classification of PESTLA input parameters according to their influence on percolation results for the *Pesticide T on Wick* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in percolation

	Parameter	Description	MAROV	Influence
1	FREU	Freundlich exponent	107.2	+
2	KOM	Kom	81.8	-
3	DEG	Degradation rates	34.6	+
4	ORG	organic matter content	13.8	-
5	BD	Bulk density	12.8	-
6	EGCV	Molar activation energy of degradation	10.0	+
7	LEDS	Lengths of dispersion in liquid phase	4.3	+
8	G2	Saturated moisture content	1.5	-
9	G6	Parameter n	1.3	+
10	COFR	Soil evaporation coefficient of Blak and Boesten or Boesten/Stroosnijder	0.914	-
11	CFTB	Crop factor	0.740	-
12	RDTB	maximum rooting depth	0.449	+
13	G4	Alpha main drying curve	0.413	-
14	RSIG	Minimum rainfall to reset models	0.396	+/-
15	RDS	maximum rooting depth allowed by soil profile	0.356	+
16	G3	Saturated hydraulic conductivity	0.341	+
17	IF1	Extinction coefficient for diffuse visible light	0.248	+
18	IR1	Extinction coefficient for direct visible light	0.248	+
19	CFLI	Coefficient describing the relationship between the conversion rate and the volume fraction of liquid	0.231	+
20	G1	Residual moisture content	0.165	-
21	GCTB	Maximum leaf area index	0.165	+
22	SUWA	Coefficient of diffusion in water	0.165	+
23	CFUP	Coefficient of uptake by plants	0.099	-
24	PSA	sand content	0.033	-
25	PCL	clay content	0.017	+
26	PSI	silt content	0	
27	HI	initial pressure heads	0	
28	TEMI	initial soil temperatures	0	
29	RDD	Root density distribution	0	
30	THAI	Thickness of the stagnant air layer at soil surface	0	
31	SUAI	Coefficient of diffusion in air	0	
32	ENSL	Molar enthalpy of the dissolution process	0	
33	SAVP	Saturated vapour pressure	0	
34	ENVP	Molar enthalpy of the vaporisation process	0	

Appendix 199. Classification of PESTLA input parameters according to their influence on pesticide losses for the *Pesticide T on Wick* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in pesticide losses

	Parameter	Description	MAROV	Influence
1	CFTB	Crop factor	0.332	-
2	COFR	Soil evaporation coefficient of Blak and Boesten or Boesten/Stroosnijder	0.304	-
3	G6	Parameter n	0.243	+
4	RSIG	Minimum rainfall to reset models	0.134	+
5	IF1	Extinction coefficient for diffuse visible light	0.061	-
6	IR1	Extinction coefficient for direct visible light	0.061	-
7	GCTB	Maximum leaf area index	0.030	-
8	G4	Alpha main drying curve	0.015	-
9	G3	Saturated hydraulic conductivity	0.004	+
10	G1	Residual moisture content	0	
11	G2	Saturated moisture content	0	
12	PSA	sand content	0	
13	PSI	silt content	0	
14	PCL	clay content	0	
15	ORG	organic matter content	0	
16	RDS	maximum rooting depth allowed by soil profile	0	
17	HI	initial pressure heads	0	
18	TEMI	initial soil temperatures	0	
19	RDTB	maximum rooting depth	0	
20	RDD	Root density distribution	0	
21	BD	Bulk density	0	
22	LEDS	Lengths of dispersion in liquid phase	0	
23	THAI	Thickness of the stagnant air layer at soil surface	0	
24	SUWA	Coefficient of diffusion in water	0	
25	SUAI	Coefficient of diffusion in air	0	
26	ENSL	Molar enthalpy of the dissolution process	0	
27	SAVP	Saturated vapour pressure	0	
28	ENVP	Molar enthalpy of the vaporisation process	0	
29	CFUP	Coefficient of uptake by plants	0	
30	DEG	Degradation rates	0	
31	EGCV	Molar activation energy of degradation	0	
32	CFLI	Coefficient describing the relationship between the conversion rate and the volume fraction of liquid	0	
33	KOM	Kom	0	
34	FREU	Freundlich exponent	0	

Appendix 200. Classification of PESTLA input parameters according to their influence on percolation results for the *Pesticide L on Hodnet* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in percolation

	Parameter	Description	MAROV	Influence
1	FREU	Freundlich exponent	9.7	+
2	G6	Parameter n	8.0	+
3	DEG	Degradation rates	7.8	+
4	KOM	Kom	7.7	-
5	EGCV	Molar activation energy of degradation	5.8	+
6	G2	Saturated moisture content	5.4	-
7	ORG	organic matter content	4.1	-
8	BD	Bulk density	4.0	-
9	LEDS	Lengths of dispersion in liquid phase	2.9	+
10	G3	Saturated hydraulic conductivity	0.352	+
11	COFR	Soil evaporation coefficient of Blak and Boesten or Boesten/Stroosnijder	0.309	-
12	SUWA	Coefficient of diffusion in water	0.307	+
13	CFTB	Crop factor	0.288	-
14	G1	Residual moisture content	0.184	-
15	G4	Alpha main drying curve	0.153	+
16	IF1	Extinction coefficient for diffuse visible light	0.153	-
17	IR1	Extinction coefficient for direct visible light	0.153	-
18	GCTB	Maximum leaf area index	0.153	-
19	RDTB	maximum rooting depth	0.153	-
20	RSIG	Minimum rainfall to reset models	0.074	+
21	RDS	maximum rooting depth allowed by soil profile	0.074	-
22	CFLI	Coefficient describing the relationship between the conversion rate and the volume fraction of liquid	0.031	+
23	CFUP	Coefficient of uptake by plants	0.012	-
24	PSA	sand content	0	
25	PSI	silt content	0	
26	PCL	clay content	0	
27	HI	initial pressure heads	0	
28	TEMI	initial soil temperatures	0	
29	RDD	Root density distribution	0	
30	THAI	Thickness of the stagnant air layer at soil surface	0	
31	SUAI	Coefficient of diffusion in air	0	
32	ENSL	Molar enthalpy of the dissolution process	0	
33	SAVP	Saturated vapour pressure	0	
34	ENVP	Molar enthalpy of the vaporisation process	0	

Appendix 201. Classification of PESTLA input parameters according to their influence on pesticide losses for the *Pesticide L on Hodnet* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in pesticide losses

	Parameter	Description	MAROV	Influence
1	CFTB	Crop factor	0.332	-
2	COFR	Soil evaporation coefficient of Blak and Boesten or Boesten/Stroosnijder	0.304	-
3	G6	Parameter n	0.243	+
4	RSIG	Minimum rainfall to reset models	0.134	+
5	IF1	Extinction coefficient for diffuse visible light	0.061	-
6	IR1	Extinction coefficient for direct visible light	0.061	-
7	GCTB	Maximum leaf area index	0.030	-
8	G4	Alpha main drying curve	0.015	-
9	G3	Saturated hydraulic conductivity	0.004	+
10	G1	Residual moisture content	0	
11	G2	Saturated moisture content	0	
12	PSA	sand content	0	
13	PSI	silt content	0	
14	PCL	clay content	0	
15	ORG	organic matter content	0	
16	RDS	maximum rooting depth allowed by soil profile	0	
17	HI	initial pressure heads	0	
18	TEMI	initial soil temperatures	0	
19	RDTB	maximum rooting depth	0	
20	RDD	Root density distribution	0	
21	BD	Bulk density	0	
22	LEDS	Lengths of dispersion in liquid phase	0	
23	THAI	Thickness of the stagnant air layer at soil surface	0	
24	SUWA	Coefficient of diffusion in water	0	
25	SUAI	Coefficient of diffusion in air	0	
26	ENSL	Molar enthalpy of the dissolution process	0	
27	SAVP	Saturated vapour pressure	0	
28	ENVP	Molar enthalpy of the vaporisation process	0	
29	CFUP	Coefficient of uptake by plants	0	
30	DEG	Degradation rates	0	
31	EGCV	Molar activation energy of degradation	0	
32	CFLI	Coefficient describing the relationship between the conversion rate and the volume fraction of liquid	0	
33	KOM	Kom	0	
34	FREU	Freundlich exponent	0	

Appendix 202. Classification of PESTLA input parameters according to their influence on percolation results for the *Pesticide T on Hodnet* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in percolation

	Parameter	Description	MAROV	Influence
1	FREU	Freundlich exponent	357.8	+
2	KOM	Kom	190.1	-
3	DEG	Degradation rates	112.7	+
4	ORG	organic matter content	20.8	-
5	BD	Bulk density	18.8	-
6	EGCV	Molar activation energy of degradation	16.2	+
7	LEDS	Lengths of dispersion in liquid phase	10.4	+
8	G6	Parameter n	4.0	+
9	COFR	Soil evaporation coefficient of Blak and Boesten or Boesten/Stroosnijder	1.8	-
10	G2	Saturated moisture content	1.8	-
11	CFTB	Crop factor	1.4	-
12	RDTB	maximum rooting depth	1.1	+
13	RDS	maximum rooting depth allowed by soil profile	0.893	+
14	RSIG	Minimum rainfall to reset models	0.828	+
15	SUWA	Coefficient of diffusion in water	0.749	+
16	PSI	silt content	0.581	+/-
17	G3	Saturated hydraulic conductivity	0.248	+
18	IF1	Extinction coefficient for diffuse visible light	0.233	+
19	IR1	Extinction coefficient for direct visible light	0.233	+
20	GCTB	Maximum leaf area index	0.233	+
21	G4	Alpha main drying curve	0.186	-
22	CFUP	Coefficient of uptake by plants	0.116	-
23	PSA	sand content	0.116	+/-
24	PCL	clay content	0.116	+/-
25	CFLI	Coefficient describing the relationship between the conversion rate and the volume fraction of liquid	0.116	+
26	G1	Residual moisture content	0.093	-
27	HI	initial pressure heads	0	
28	TEMI	initial soil temperatures	0	
29	RDD	Root density distribution	0	
30	THAI	Thickness of the stagnant air layer at soil surface	0	
31	SUAI	Coefficient of diffusion in air	0	
32	ENSL	Molar enthalpy of the dissolution process	0	
33	SAVP	Saturated vapour pressure	0	
34	ENVP	Molar enthalpy of the vaporisation process	0	

Appendix 203. Classification of PESTLA input parameters according to their influence on pesticide losses for the *Pesticide T on Hodnet* scenario

MAROV is an index related to the sensitivity of the model to a particular parameter.
A positive (resp. negative) influence means that an increase in the value of the parameter resulted in an increase (resp. decrease) in pesticide losses

		Wick		Hodnet	
		Pesticide L	Pesticide T	Pesticide L	Pesticide T
G1	Residual moisture content	0.038	0.038	0	0
G2	Saturated moisture content	0.153	0.153	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
G6	Parameter n	0.153	0.153	0.243	0.243
COFR	Soil evaporation coefficient of Blak and Boesten or Boesten/Stroosnijder	0.307	0.307	0.304	0.304
RSIG	Minimum rainfall to reset models	0.123	0.123	0.134	0.134
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
RDS	maximum rooting depth allowed by soil profile	0.061	0.061	0	0
HI	initial pressure heads	0	0	0	0
TEMI	initial soil temperatures	0	0	0	0
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
GCTB	Maximum leaf area index	0.061	0.061	0.030	0.030
CFTB	Crop factor	0.331	0.331	0.332	0.332
RDTB	maximum rooting depth	0.153	0.153	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	Degradation rates	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

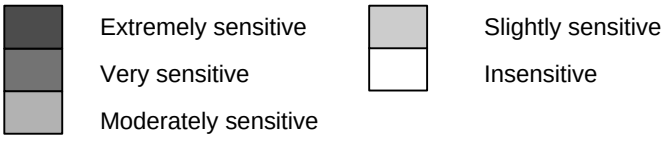
Appendix 204. Sensitivity indices (MAROV values) of PESTLA parameters with regard to percolation for the four scenarios

		Wick		Hodnet		
		Pesticide L	Pesticide T	Pesticide L	Pesticide T	Influence
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	Degradation rates	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	

Appendix 205. Classification of PESTLA parameters according to their influence on percolation (values presented are MAROV)

A positive (resp. negative) influence means that an increase in the value of the parameter will result in an increase (resp. decrease) in percolation

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



		Wick		Hodnet	
		Pesticide L	Pesticide T	Pesticide L	Pesticide T
CFTB	Crop factor	1	1	1	1
COFR	Soil evaporation coefficient of Blak and Boesten or Boesten/Stroosnijder	2	2	2	2
G6	Parameter n	3	3	3	3
RSIG	Minimum rainfall to reset models	6	6	4	4
IF1	Extinction coefficient for diffuse visible light	7=	7=	5=	5=
IR1	Extinction coefficient for direct visible light	7=	7=	5=	5=
G2	Saturated moisture content	3	3	-	-
RDTB	maximum rooting depth	3	3	-	-
GCTB	Maximum leaf area index	9=	9=	7	7
RDS	maximum rooting depth allowed by soil profile	9=	9=	-	-
G1	Residual moisture content	11	11	-	-
G3	Saturated hydraulic conductivity	12	12	9	9
G4	Alpha main drying curve	-	-	8	8
PSA	sand content	-	-	-	-
PSI	silt content	-	-	-	-
PCL	clay content	-	-	-	-
ORG	organic matter content	-	-	-	-
HI	initial pressure heads	-	-	-	-
TEMI	initial soil temperatures	-	-	-	-
RDD	Root density distribution	-	-	-	-
BD	Bulk density	-	-	-	-
LEDS	Lengths of dispersion in liquid phase	-	-	-	-
THAI	Thickness of the stagnant air layer at soil surface	-	-	-	-
SUWA	Coefficient of diffusion in water	-	-	-	-
SUAI	Coefficient of diffusion in air	-	-	-	-
ENSL	Molar enthalpy of the dissolution process	-	-	-	-
SAVP	Saturated vapour pressure	-	-	-	-
ENVP	Molar enthalpy of the vaporisation process	-	-	-	-
CFUP	Coefficient of uptake by plants	-	-	-	-
DEG	Degradation rates	-	-	-	-
EGCV	Molar activation energy of degradation	-	-	-	-
CFLI	Coefficient describing the relationship between the conversion rate and the volume fraction of liquid	-	-	-	-
KOM	Kom	-	-	-	-
FREU	Freundlich exponent	-	-	-	-

Appendix 206. Ranking of PESTLA input parameters as a function of their influence on percolation results

Parameters with the lowest ranking have the largest influence on percolation and vice versa

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

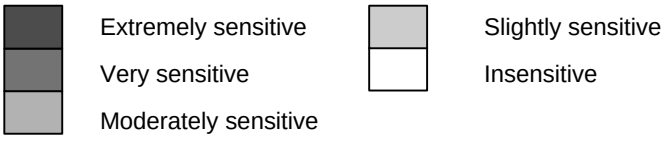
Appendix 207. Sensitivity indices (MAROV values) of PESTLA parameters with regard to pesticide losses for the four scenarios

		Wick		Hodnet		
		Pesticide L	Pesticide T	Pesticide L	Pesticide T	Influence
FREU	Freundlich exponent	4.5	107.2	9.7	357.8	+
KOM	Kom	4.6	81.8	7.7	190.1	-
DEG	Degradation rates	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	

Appendix 208. Classification of PESTLA parameters according to their influence on pesticide losses (values presented are MAROV)

A positive (resp. negative) influence means that an increase in the value of the parameter will result in an increase (resp. decrease) in pesticide losses

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



		Wick		Hodnet	
		Pesticide L	Pesticide T	Pesticide L	Pesticide T
FREU	Freundlich exponent	2	1	1	1
KOM	Kom	1	2	4	2
DEG	Degradation rates	4	3	3	3
ORG	organic matter content	5	4	7	4
BD	Bulk density	6	5	8	5
EGCV	Molar activation energy of degradation	3	6	5	6
LEDS	Lengths of dispersion in liquid phase	9	7	9	7
G6	Parameter n	7	9	2	8
G2	Saturated moisture content	8	8	6	10
COFR	Soil evaporation coefficient of Blak and Boesten or Boesten/Stroosnijder	13	10	11	9
CFTB	Crop factor	12	11	13	11
RDTB	maximum rooting depth	14=	12	15=	12
RDS	maximum rooting depth allowed by soil profile	19	15	20=	13
SUWA	Coefficient of diffusion in water	14=	20=	12	15
RSIG	Minimum rainfall to reset models	21	14	20=	14
G3	Saturated hydraulic conductivity	11	16	10	17
G1	Residual moisture content	10	20=	14	26
G4	Alpha main drying curve	14=	13	15=	21
IF1	Extinction coefficient for diffuse visible light	17=	17=	15=	18=
IR1	Extinction coefficient for direct visible light	17=	17=	15=	18=
GCTB	Maximum leaf area index	20	20=	15=	18=
PSI	silt content	-	-	-	16
CFLI	Coefficient describing the relationship between the conversion rate and the volume fraction of liquid	21=	19	22	25
CFUP	Coefficient of uptake by plants	21=	23	23	22
PSA	sand content	-	24	-	23=
PCL	clay content	-	25	-	23=
HI	initial pressure heads	-	-	-	-
TEMI	initial soil temperatures	-	-	-	-
RDD	Root density distribution	-	-	-	-
THAI	Thickness of the stagnant air layer at soil surface	-	-	-	-
SUAI	Coefficient of diffusion in air	-	-	-	-
ENSL	Molar enthalpy of the dissolution process	-	-	-	-
SAVP	Saturated vapour pressure	-	-	-	-
ENVP	Molar enthalpy of the vaporisation process	-	-	-	-

Appendix 209. Ranking of PESTLA input parameters as a function of their influence on pesticide losses results

Parameters with the lowest ranking have the largest influence on pesticide losses and vice versa

Parameter ALW	Description	Distribution	Mean	Variance	Min	Max
CFTB	Crop factor	Normal	0.1048	2.859E-05	0.09432	0.11528
COFR	Soil evaporation coefficient of Blak and Boesten or Boesten/Stroosnijder	Normal	0.4602	5.513E-04	0.41418	0.50622
G2	Saturated moisture content	Log-normal	288	3.766E+04	72	1152
G6	Parameter n	Normal	0.0728	3.449E-06	0.06916	0.07644
RDTB	maximum rooting depth	Normal	1.4508	1.370E-03	1.37826	1.52334
RSIG	Minimum rainfall to reset models	Log-normal	0.63	6.923E-04	0.58	0.71
IF1	Extinction coefficient for diffuse visible light	Normal	0.5	1.627E-02	0.25	0.75
IR1	Extinction coefficient for direct visible light	Normal	0.57	8.458E-04	0.513	0.627
RDS	maximum rooting depth allowed by soil profile	Normal	0.33	2.835E-04	0.297	0.363
GCTB	Maximum leaf area index	Normal	0.1	2.603E-05	0.09	0.11
G1	Residual moisture content	Normal	0.0292	3.009E-06	0.0258	0.0326
G3	Saturated hydraulic conductivity	Normal	80	1.041E+02	60	100
G4	Alpha main drying curve	Normal	-50	7.523E+01	-71	-37
PSA	sand content	Normal	8	1.041E+00	6	10
ORG	organic matter content	Normal	6.2	2.562E-01	5.208	7.192
HI	initial pressure heads	Normal	0.75	1.627E-02	0.5	1
TEMI	initial soil temperatures	Normal	80	1.041E+02	60	100
RDD	Root density distribution	Normal	1	4.067E-03	0.75	1
BD	Bulk density	Normal	1.35	4.744E-03	1.215	1.485
LEDS	Lengths of dispersion in liquid phase	Normal	0.05	6.250E-04	0.002	0.1
THAI	Thickness of the stagnant air layer at soil surface	Log-normal	0.01	1.449E-04	0.001	0.1
SUWA	Coefficient of diffusion in water	Normal	3.97E-05	3.790E-10	1.0E-05	8.6E-05
SUAI	Coefficient of diffusion in air	Log-normal	0.4303	2.082E-02	0.21515	0.8606
ENSL	Molar enthalpy of the dissolution process	Log-normal	40000	1.799E+08	20000	80000
SAVP	Saturated vapour pressure	Log-normal	0.003	1.304E-05	0.0003	0.03
ENVP	Molar enthalpy of the vaporisation process	Log-normal	100000	1.125E+09	50000	200000
CFUP	Coefficient of uptake by plants	Normal	0.5	6.508E-02	0	1
DEG	Degradation rates	Log-normal	7.762	6.776E+00	3.881	15.524
EGCV	Molar activation energy of degradation	Log-normal	55000	6.132E+07	41250	68750
CFLI	Coefficient describing the relationship between the conversion rate and the volume fraction of liquid	Normal	0.7	2.041E-02	0.42	0.98
KOM	Kom	Log-normal	11.628	1.521E+01	5.814	23.256
FREU	Freundlich exponent	Normal	0.9	8.434E-03	0.72	1.08

Appendix 210. Parameterisation of probability distribution functions for PESTLA parameters for the Monte Carlo approach.
(Pesticide L on Wick scenario)

Parameter ATW	Description	Distribution	Mean	Variance	Min	Max
CFTB	Crop factor	Normal	0.1048	2.859E-05	0.09432	0.11528
COFR	Soil evaporation coefficient of Blak and Boesten or Boesten/Stroosnijder	Normal	0.4602	5.513E-04	0.41418	0.50622
G2	Saturated moisture content	Log-normal	288	3.766E+04	72	1152
G6	Parameter n	Normal	0.0728	3.449E-06	0.06916	0.07644
RDTB	maximum rooting depth	Normal	1.4508	1.370E-03	1.37826	1.52334
RSIG	Minimum rainfall to reset models	Log-normal	0.63	6.923E-04	0.58	0.71
IF1	Extinction coefficient for diffuse visible light	Normal	0.5	1.627E-02	0.25	0.75
IR1	Extinction coefficient for direct visible light	Normal	0.57	8.458E-04	0.513	0.627
RDS	maximum rooting depth allowed by soil profile	Normal	0.33	2.835E-04	0.297	0.363
GCTB	Maximum leaf area index	Normal	0.1	2.603E-05	0.09	0.11
G1	Residual moisture content	Normal	0.0292	3.009E-06	0.0258	0.0326
G3	Saturated hydraulic conductivity	Normal	80	1.041E+02	60	100
G4	Alpha main drying curve	Normal	-50	7.523E+01	-71	-37
PSA	sand content	Normal	8	1.041E+00	6	10
ORG	organic matter content	Normal	6.2	2.562E-01	5.208	7.192
HI	initial pressure heads	Normal	0.75	1.627E-02	0.5	1
TEMI	initial soil temperatures	Normal	80	1.041E+02	60	100
RDD	Root density distribution	Normal	1	4.067E-03	0.75	1
BD	Bulk density	Normal	1.35	4.744E-03	1.215	1.485
LEDS	Lengths of dispersion in liquid phase	Normal	0.05	6.250E-04	0.002	0.1
THAI	Thickness of the stagnant air layer at soil surface	Log-normal	0.01	1.449E-04	0.001	0.1
SUWA	Coefficient of diffusion in water	Normal	3.97E-05	3.790E-10	1.0E-05	8.6E-05
SUAI	Coefficient of diffusion in air	Log-normal	0.4303	2.082E-02	0.21515	0.8606
ENSL	Molar enthalpy of the dissolution process	Log-normal	40000	1.799E+08	20000	80000
SAVP	Saturated vapour pressure	Log-normal	3E-08	1.304E-15	3E-09	3E-07
ENVP	Molar enthalpy of the vaporisation process	Log-normal	100000	1.125E+09	50000	200000
CFUP	Coefficient of uptake by plants	Normal	0.5	6.508E-02	0	1
DEG	Degradation rates	Log-normal	23.26	6.085E+01	11.63	46.52
EGCV	Molar activation energy of degradation	Log-normal	55000	6.132E+07	41250	68750
CFLI	Coefficient describing the relationship between the conversion rate and the volume fraction of liquid	Normal	0.7	2.041E-02	0.42	0.98
KOM	Kom	Log-normal	58.14	3.802E+02	29.07	116.28
FREU	Freundlich exponent	Normal	0.9	8.434E-03	0.72	1.08

Appendix 211. Parameterisation of probability distribution functions for PESTLA parameters for the Monte Carlo approach.
(Pesticide T on Wick scenario)

Parameter ALH	Description	Distribution	Mean	Variance	Min	Max
CFTB	Crop factor	Normal	0.0012	3.749E-09	0.00108	0.00132
COFR	Soil evaporation coefficient of Blak and Boesten or Boesten/Stroosnijder	Normal	0.4476	5.215E-04	0.40284	0.49236
G2	Saturated moisture content	Log-normal	98.12	4.371E+03	24.53	392.48
G6	Parameter n	Normal	0.0526	1.801E-06	0.04997	0.05523
RDTB	maximum rooting depth	Normal	1.1395	8.450E-04	1.082525	1.196475
RSIG	Minimum rainfall to reset models	Log-normal	0.63	6.923E-04	0.58	0.71
IF1	Extinction coefficient for diffuse visible light	Normal	0.5	1.627E-02	0.25	0.75
IR1	Extinction coefficient for direct visible light	Normal	0.33	2.835E-04	0.297	0.363
RDS	maximum rooting depth allowed by soil profile	Normal	0.48	5.998E-04	0.432	0.528
GCTB	Maximum leaf area index	Normal	0.19	9.397E-05	0.171	0.209
G1	Residual moisture content	Normal	0.0198	3.009E-06	0.0258	0.0326
G3	Saturated hydraulic conductivity	Normal	80	1.041E+02	60	100
G4	Alpha main drying curve	Normal	-50	1.058E+03	-141	-13.5
PSA	sand content	Normal	8	1.041E+00	6	10
ORG	organic matter content	Normal	6.2	2.562E-01	5.208	7.192
HI	initial pressure heads	Normal	0.75	1.627E-02	0.5	1
TEMI	initial soil temperatures	Normal	80	1.041E+02	60	100
RDD	Root density distribution	Normal	1	4.067E-03	0.75	1
BD	Bulk density	Normal	1.39	5.030E-03	1.251	1.529
LEDS	Lengths of dispersion in liquid phase	Normal	0.05	6.250E-04	0.002	0.1
THAI	Thickness of the stagnant air layer at soil surface	Log-normal	0.01	1.449E-04	0.001	0.1
SUWA	Coefficient of diffusion in water	Normal	3.97E-05	3.790E-10	1.0E-05	8.6E-05
SUAI	Coefficient of diffusion in air	Log-normal	0.4303	2.082E-02	0.21515	0.8606
ENSL	Molar enthalpy of the dissolution process	Log-normal	40000	1.799E+08	20000	80000
SAVP	Saturated vapour pressure	Log-normal	0.003	1.304E-05	0.0003	0.03
ENVP	Molar enthalpy of the vaporisation process	Log-normal	100000	1.125E+09	50000	200000
CFUP	Coefficient of uptake by plants	Normal	0.5	6.508E-02	0	1
DEG	Degradation rates	Log-normal	7.762	6.776E+00	3.881	15.524
EGCV	Molar activation energy of degradation	Log-normal	55000	6.132E+07	41250	68750
CFLI	Coefficient describing the relationship between the conversion rate and the volume fraction of liquid	Normal	0.7	2.041E-02	0.42	0.98
KOM	Kom	Log-normal	11.628	1.521E+01	5.814	23.256
FREU	Freundlich exponent	Normal	0.9	8.434E-03	0.72	1.08

Appendix 212. Parameterisation of probability distribution functions for PESTLA parameters for the Monte Carlo approach.
(Pesticide L on Hodnet scenario)

Parameter ATH	Description	Distribution	Mean	Variance	Min	Max
CFTB	Crop factor	Normal	0.0012	3.749E-09	0.00108	0.00132
COFR	Soil evaporation coefficient of Blak and Boesten or Boesten/Stroosnijder	Normal	0.4476	5.215E-04	0.40284	0.49236
G2	Saturated moisture content	Log-normal	98.12	4.371E+03	24.53	392.48
G6	Parameter n	Normal	0.0526	1.801E-06	0.04997	0.05523
RDTB	maximum rooting depth	Normal	1.1395	8.450E-04	1.082525	1.196475
RSIG	Minimum rainfall to reset models	Log-normal	0.63	6.923E-04	0.58	0.71
IF1	Extinction coefficient for diffuse visible light	Normal	0.5	1.627E-02	0.25	0.75
IR1	Extinction coefficient for direct visible light	Normal	0.33	2.835E-04	0.297	0.363
RDS	maximum rooting depth allowed by soil profile	Normal	0.48	5.998E-04	0.432	0.528
GCTB	Maximum leaf area index	Normal	0.19	9.397E-05	0.171	0.209
G1	Residual moisture content	Normal	0.0198	1.377E-06	0.0175	0.0221
G3	Saturated hydraulic conductivity	Normal	80	1.041E+02	60	100
G4	Alpha main drying curve	Normal	-50	1.058E+03	-141	-13.5
PSA	sand content	Normal	8	1.041E+00	6	10
ORG	organic matter content	Normal	6.2	2.562E-01	5.208	7.192
HI	initial pressure heads	Normal	0.75	1.627E-02	0.5	1
TEMI	initial soil temperatures	Normal	80	1.041E+02	60	100
RDD	Root density distribution	Normal	1	4.067E-03	0.75	1
BD	Bulk density	Normal	1.39	5.030E-03	1.251	1.529
LEDS	Lengths of dispersion in liquid phase	Normal	0.05	6.250E-04	0.002	0.1
THAI	Thickness of the stagnant air layer at soil surface	Log-normal	0.01	1.449E-04	0.001	0.1
SUWA	Coefficient of diffusion in water	Normal	3.97E-05	3.790E-10	1.0E-05	8.6E-05
SUAI	Coefficient of diffusion in air	Log-normal	0.4303	2.082E-02	0.21515	0.8606
ENSL	Molar enthalpy of the dissolution process	Log-normal	40000	1.799E+08	20000	80000
SAVP	Saturated vapour pressure	Log-normal	3E-08	1.304E-15	3E-09	3E-07
ENVP	Molar enthalpy of the vaporisation process	Log-normal	100000	1.125E+09	50000	200000
CFUP	Coefficient of uptake by plants	Normal	0.5	6.508E-02	0	1
DEG	Degradation rates	Log-normal	23.26	6.085E+01	11.63	46.52
EGCV	Molar activation energy of degradation	Log-normal	55000	6.132E+07	41250	68750
CFLI	Coefficient describing the relationship between the conversion rate and the volume fraction of liquid	Normal	0.7	2.041E-02	0.42	0.98
KOM	Kom	Log-normal	58.14	3.802E+02	29.07	116.28
FREU	Freundlich exponent	Normal	0.9	8.434E-03	0.72	1.08

Appendix 213. Parameterisation of probability distribution functions for PESTLA parameters for the Monte Carlo approach.
(Pesticide T on Hodnet scenario)

	Mean	Standard deviation	Variance	Min	Max
G1	0.1048	0.0047	2.18E-05	0.0946	0.1153
G2	0.4602	0.0205	4.21E-04	0.4143	0.5060
G3	287.9237	174.5505	3.05E+04	73.7565	1063.6104
G4	0.0728	0.0016	2.63E-06	0.0693	0.0764
G6	1.4508	0.0323	1.04E-03	1.3788	1.5229
COFR	0.6313	0.0246	6.03E-04	0.5811	0.7000
RSIG	0.5000	0.1112	1.24E-02	0.2518	0.7430
PSA	0.5700	0.0254	6.45E-04	0.5139	0.6266
ORG	0.0292	0.0015	2.29E-06	0.0259	0.0326
RDS	79.9975	8.9019	7.92E+01	60.3989	99.7229
HI	-51.0169	7.3788	5.44E+01	-70.8935	-36.9981
TEMI	7.9998	0.8909	7.94E-01	6.0475	9.9982
IF1	0.6000	0.1799	3.24E-02	0.3054	1.1596
IR1	0.7500	0.2251	5.07E-02	0.3801	1.4477
GCTB	6.2001	0.4419	1.95E-01	5.2080	7.1799
CFTB	0.7500	0.1114	1.24E-02	0.5049	0.9955
RDTB	79.9964	8.9048	7.93E+01	60.3437	100.0018
RDD	0.9492	0.0385	1.48E-03	0.8021	1.0000
BD	1.3500	0.0601	3.61E-03	1.2174	1.4848
LEDS	0.0502	0.0218	4.76E-04	0.0024	0.0995
THAI	0.0100	0.0105	1.10E-04	0.0010	0.0802
SUWA	0.0000	0.0000	2.76E-10	0.0000	0.0001
SUAI	0.4302	0.1292	1.67E-02	0.2152	0.8464
ENSL	4.00E+04	1.20E+04	1.45E+08	2.03E+04	7.95E+04
SAVP	0.0030	0.0033	1.11E-05	0.0003	0.0294
ENVP	1.00E+05	3.01E+04	9.06E+08	5.09E+04	1.99E+05
CFUP	0.4999	0.2225	4.95E-02	0.0140	0.9865
DEG	7.7622	2.3344	5.45E+00	3.9061	15.0428
EGCV	5.45E+04	6.39E+03	4.08E+07	4.14E+04	6.85E+04
CFLI	0.7000	0.1246	1.55E-02	0.4255	0.9719
KOM	11.6254	3.4906	1.22E+01	5.8583	22.7129
FREU	0.9000	0.0802	6.44E-03	0.7254	1.0784

Appendix 214. Statistics for PESTLA input parameters as generated by Monte Carlo sampling *(Pesticide L on Wick scenario)*

	Mean	Standard deviation	Variance	Min	Max
G1	0.1048	0.0047	2.18E-05	0.0944	0.1151
G2	0.4602	0.0205	4.20E-04	0.4155	0.5049
G3	287.8363	173.9517	3.03E+04	74.2262	1121.9556
G4	0.0728	0.0016	2.63E-06	0.0692	0.0764
G6	1.4508	0.0323	1.04E-03	1.3805	1.5225
COFR	0.6313	0.0246	6.05E-04	0.5802	0.7033
RSIG	0.5000	0.1113	1.24E-02	0.2549	0.7466
PSA	0.5700	0.0254	6.44E-04	0.5137	0.6254
ORG	0.0292	0.0015	2.29E-06	0.0259	0.0325
RDS	80.0039	8.8998	7.92E+01	60.4827	99.8005
HI	-51.0167	7.3759	5.44E+01	-69.8541	-37.2394
TEMI	7.9998	0.8911	7.94E-01	6.0304	9.9728
IF1	0.6001	0.1804	3.25E-02	0.3059	1.1905
IR1	0.7500	0.2249	5.06E-02	0.3779	1.4790
GCTB	6.2001	0.4419	1.95E-01	5.2279	7.1921
CFTB	0.7501	0.1112	1.24E-02	0.5031	0.9948
RDTB	80.0022	8.8970	7.92E+01	60.4030	99.6477
RDD	0.9492	0.0383	1.46E-03	0.8108	0.9998
BD	1.3500	0.0601	3.61E-03	1.2170	1.4810
LEDS	0.0502	0.0218	4.75E-04	0.0027	0.0987
THAI	0.0101	0.0110	1.21E-04	0.0010	0.0960
SUWA	0.0000	0.0000	2.77E-10	0.0000	0.0001
SUAI	0.4303	0.1292	1.67E-02	0.2173	0.8541
ENSL	4.00E+04	1.20E+04	1.45E+08	2.02E+04	7.92E+04
SAVP	0.0000	0.0000	1.11E-15	0.0000	0.0000
ENVP	1.00E+05	3.01E+04	9.08E+08	5.03E+04	2.00E+05
CFUP	0.4999	0.2227	4.96E-02	0.0071	0.9854
DEG	23.2579	6.9805	4.87E+01	11.7529	45.1812
EGCV	5.45E+04	6.40E+03	4.09E+07	4.15E+04	6.85E+04
CFLI	0.7000	0.1247	1.56E-02	0.4240	0.9792
KOM	58.1315	17.4252	3.04E+02	29.1111	112.3338
FREU	0.9000	0.0802	6.43E-03	0.7237	1.0755

Appendix 215. Statistics for PESTLA input parameters as generated by Monte Carlo sampling *(Pesticide T on Wick scenario)*

	Mean	Standard deviation	Variance	Min	Max
G1	0.0012	0.0001	2.86E-09	0.0011	0.0013
G2	0.4476	0.0199	3.97E-04	0.4034	0.4911
G3	98.0854	59.2302	3.51E+03	25.3113	364.0166
G4	0.0526	0.0012	1.37E-06	0.0500	0.0552
G6	1.1395	0.0254	6.45E-04	1.0827	1.1964
COFR	0.6313	0.0246	6.06E-04	0.5808	0.7030
RSIG	0.5000	0.1114	1.24E-02	0.2512	0.7459
PSA	0.3300	0.0147	2.16E-04	0.2975	0.3625
ORG	0.0198	0.0010	1.05E-06	0.0175	0.0220
RDS	79.9989	8.9069	7.93E+01	59.9963	99.6781
HI	-57.6990	26.2012	6.87E+02	-140.8497	-13.8533
TEMI	8.0005	0.8909	7.94E-01	6.0438	9.9979
IF1	0.6001	0.1804	3.25E-02	0.3051	1.1896
IR1	0.7499	0.2251	5.07E-02	0.3814	1.4862
GCTB	6.1996	0.4424	1.96E-01	5.2216	7.1913
CFTB	0.7500	0.1114	1.24E-02	0.5023	0.9955
RDTB	79.9983	8.9129	7.94E+01	60.2958	99.4471
RDD	0.9491	0.0387	1.50E-03	0.7871	0.9997
BD	1.3900	0.0619	3.83E-03	1.2515	1.5261
LEDS	0.0502	0.0218	4.75E-04	0.0031	0.0984
THAI	0.0100	0.0105	1.10E-04	0.0010	0.0821
SUWA	0.0000	0.0000	2.75E-10	0.0000	0.0001
SUAI	0.4304	0.1295	1.68E-02	0.2161	0.8553
ENSL	4.00E+04	1.20E+04	1.44E+08	2.03E+04	7.80E+04
SAVP	0.0030	0.0031	9.73E-06	0.0003	0.0227
ENVP	1.00E+05	3.01E+04	9.06E+08	5.10E+04	2.00E+05
CFUP	0.5000	0.2228	4.96E-02	0.0092	0.9877
DEG	7.7634	2.3342	5.45E+00	3.9479	15.1372
EGCV	5.45E+04	6.39E+03	4.08E+07	4.14E+04	6.86E+04
CFLI	0.7000	0.1247	1.56E-02	0.4225	0.9797
KOM	11.6304	3.4981	1.22E+01	5.8326	22.6001
FREU	0.9001	0.0802	6.44E-03	0.7233	1.0768

Appendix 216. Statistics for PESTLA input parameters as generated by Monte Carlo sampling *(Pesticide L on Hodnet scenario)*

	Mean	Standard deviation	Variance	Min	Max
G1	0.0012	0.0001	2.86E-09	0.0011	0.0013
G2	0.4476	0.0199	3.98E-04	0.4030	0.4910
G3	97.9672	58.9173	3.47E+03	24.6900	362.6327
G4	0.0526	0.0012	1.37E-06	0.0500	0.0552
G6	1.1395	0.0254	6.45E-04	1.0828	1.1963
COFR	0.6313	0.0246	6.03E-04	0.5808	0.7009
RSIG	0.5001	0.1113	1.24E-02	0.2573	0.7476
PSA	0.3300	0.0147	2.16E-04	0.2979	0.3620
ORG	0.0198	0.0010	1.05E-06	0.0175	0.0221
RDS	79.9967	8.9055	7.93E+01	60.1862	99.8111
HI	-57.6896	26.1555	6.84E+02	-137.8874	-13.9769
TEMI	7.9998	0.8904	7.93E-01	6.0455	9.9602
IF1	0.6002	0.1807	3.27E-02	0.3037	1.1945
IR1	0.7499	0.2254	5.08E-02	0.3766	1.4675
GCTB	6.2000	0.4419	1.95E-01	5.2163	7.1867
CFTB	0.7500	0.1114	1.24E-02	0.5011	0.9944
RDTB	80.0066	8.8981	7.92E+01	60.1110	99.7438
RDD	0.9492	0.0385	1.48E-03	0.7947	0.9998
BD	1.3900	0.0619	3.83E-03	1.2547	1.5270
LEDS	0.0502	0.0218	4.76E-04	0.0021	0.0992
THAI	0.0100	0.0106	1.13E-04	0.0011	0.0833
SUWA	0.0000	0.0000	2.76E-10	0.0000	0.0001
SUAI	0.4304	0.1296	1.68E-02	0.2167	0.8598
ENSL	4.00E+04	1.20E+04	1.44E+08	2.03E+04	7.82E+04
SAVP	0.0000	0.0000	9.61E-16	0.0000	0.0000
ENVP	1.00E+05	3.00E+04	9.01E+08	5.03E+04	1.96E+05
CFUP	0.5000	0.2226	4.96E-02	0.0066	0.9975
DEG	23.2650	6.9987	4.90E+01	11.7261	45.3584
EGCV	5.45E+04	6.39E+03	4.08E+07	4.13E+04	6.87E+04
CFLI	0.6999	0.1248	1.56E-02	0.4207	0.9768
KOM	58.1459	17.4893	3.06E+02	29.2121	115.6739
FREU	0.9000	0.0802	6.44E-03	0.7219	1.0769

Appendix 217. Statistics for PESTLA input parameters as generated by Monte Carlo sampling *(Pesticide T on Hodnet scenario)*

Pesticide L on Wick	**Recharge (mm)**	**Pesticide losses (g ha^{-1})**
Number of successful model runs	240	240
Basic statistics		
Minimum value	2464.00	0.00551
Mean value	2656.76	50.45
Maximum value	2970.00	317.00
Range	506.00	316.99
Frequency		
Minimum value	2464.00	0.00551
25th-percentile value	2576.00	10.65
Median value	2649.00	33.45
75th-percentile value	2728.00	69.25
Maximum value	2970.00	317.00
Dispersion		
Standard deviation	106.48	55.88
Variance	11338.82	3122.79
Standard error of the mean	6.87	3.61
Coefficient of variation	0.04	1.11

Appendix 218. Statistics for the PESTLA output variables (Monte Carlo runs)
***Pesticide L on Wick* scenario**

Pesticide T on Wick	**Recharge (mm)**	**Pesticide losses (g ha^{-1})**
Number of successful model runs	240	240
Basic statistics		
Minimum value	2408.00	0
Mean value	2655.06	8.08
Maximum value	2978.00	128.00
Range	570.00	128.00
Frequency		
Minimum value	2408.00	0
25th-percentile value	2590.00	0.01
Median value	2648.00	0.53
75th-percentile value	2728.00	5.12
Maximum value	2978.00	128.00
Dispersion		
Standard deviation	104.00	18.23
Variance	10816.73	332.31
Standard error of the mean	6.71	1.18
Coefficient of variation	0.04	2.26

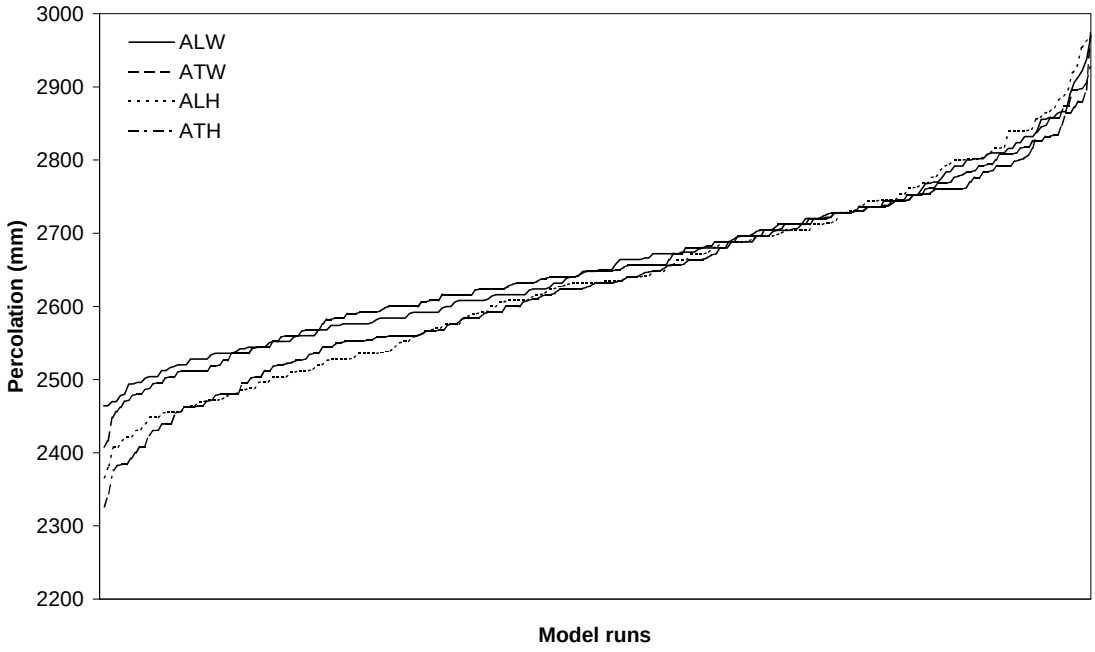
Appendix 219. Statistics for the PESTLA output variables (Monte Carlo runs)
***Pesticide T on Wick* scenario**

Pesticide L on Hodnet	**Recharge (mm)**	**Pesticide losses (g ha^{-1})**
Number of successful model runs	218	218
Basic statistics		
Minimum value	2366	0
Mean value	2637.16	6.99
Maximum value	2968.00	65.20
Range	602.00	65.20
Frequency		
Minimum value	2366	0
25th-percentile value	2528.50	0.51
Median value	2632.00	2.85
75th-percentile value	2728.00	9.70
Maximum value	2968.00	65.20
Dispersion		
Standard deviation	130.83	10.47
Variance	17117.30	109.57
Standard error of the mean	8.86	0.71
Coefficient of variation	0.05	1.50

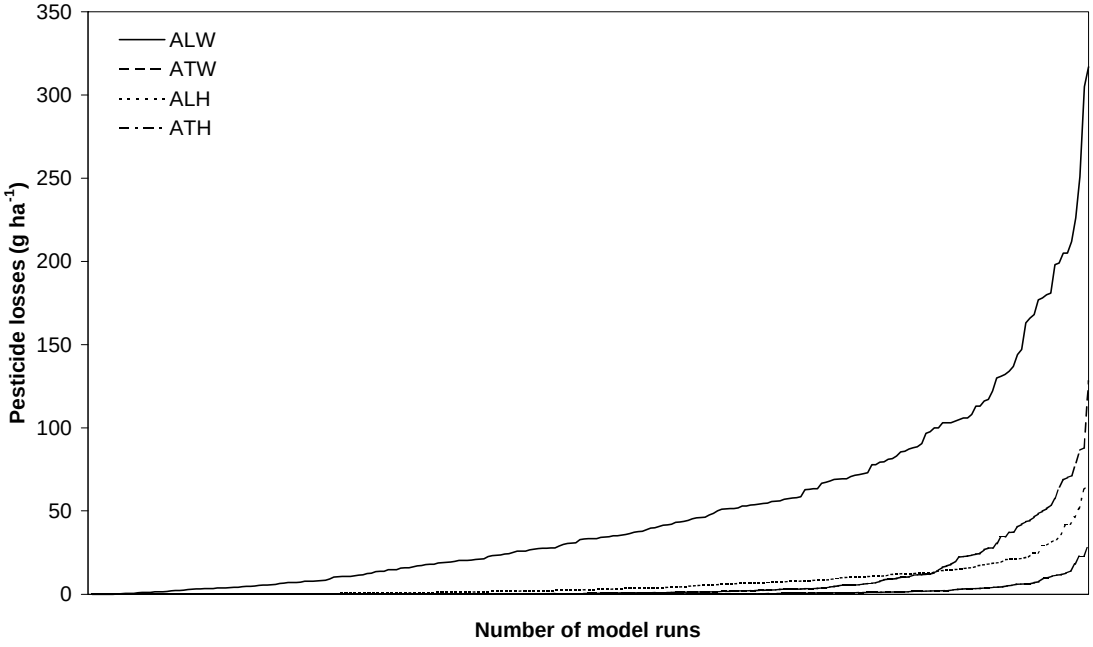
Appendix 220. Statistics for the PESTLA output variables (Monte Carlo runs)
***Pesticide L on Hodnet* scenario**

Pesticide T on Hodnet	**Recharge (mm)**	**Pesticide losses (g ha^{-1})**
Number of successful model runs	222	222
Basic statistics		
Minimum value	2326	0
Mean value	2632.38	1.43
Maximum value	2930.00	29.70
Range	604.00	29.70
Frequency		
Minimum value	2326	0
25th-percentile value	2552.00	4.64E-06
Median value	2632.00	0.04
75th-percentile value	2728.00	0.84
Maximum value	2930.00	29.70
Dispersion		
Standard deviation	124.34	3.85
Variance	15459.30	14.79
Standard error of the mean	8.34	0.26
Coefficient of variation	0.05	2.68

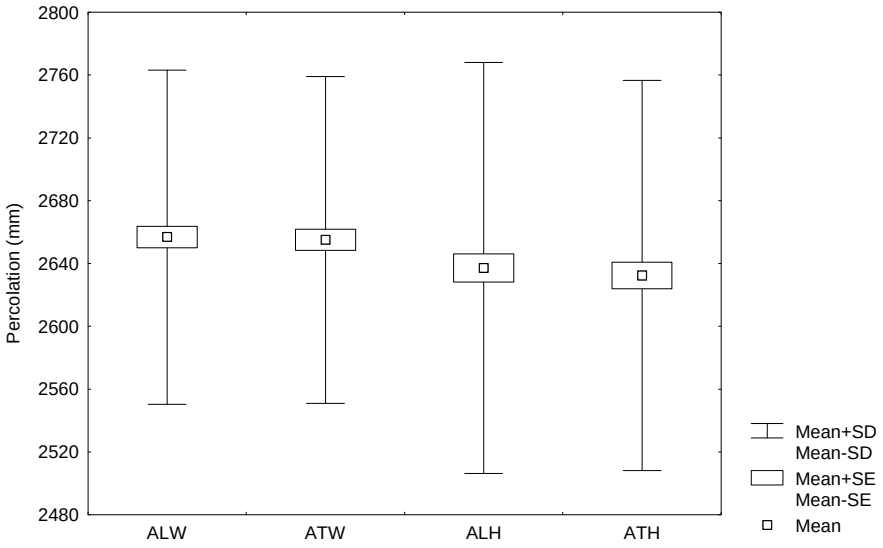
Appendix 221. Statistics for the PESTLA output variables (Monte Carlo runs)
***Pesticide T on Hodnet* scenario**



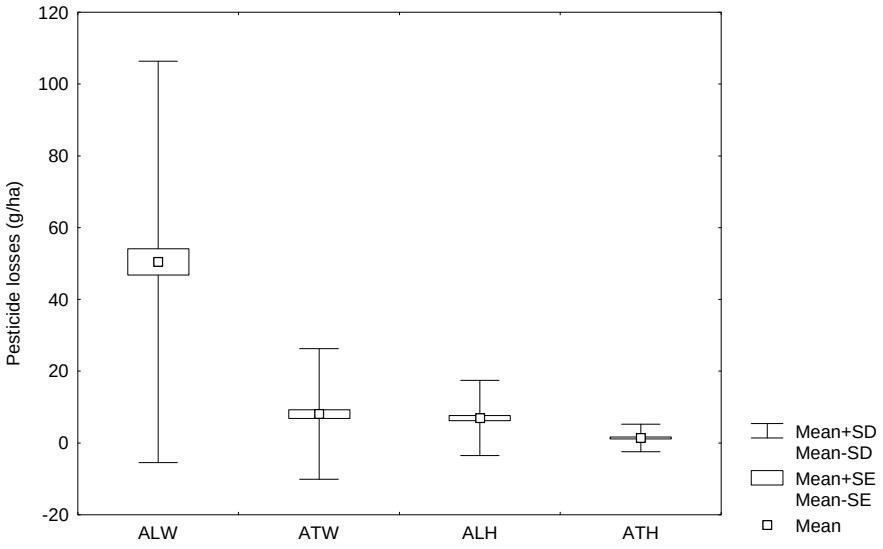
Appendix 222. Distribution of the percolation values obtained by running the different Monte Carlo-generated input files for the four scenarios (PESTLA).



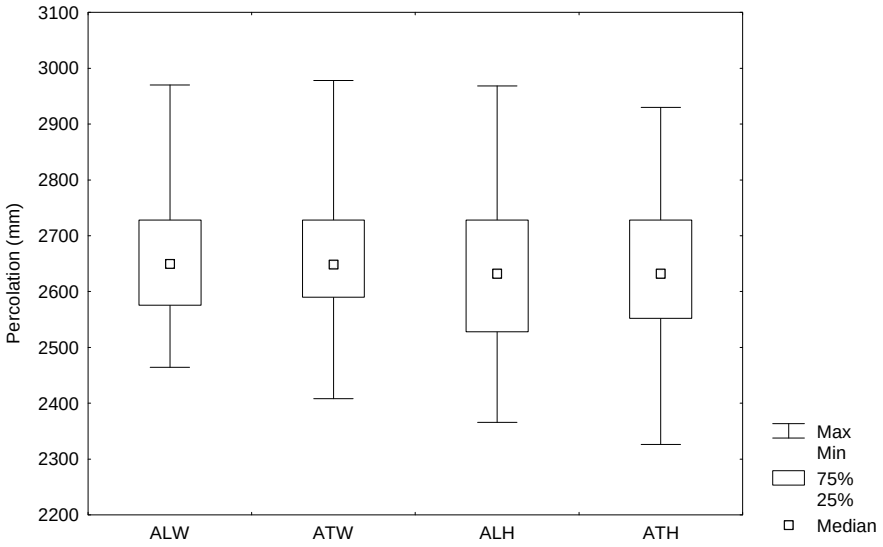
Appendix 223. Distribution of the values for pesticide losses obtained by running the different Monte Carlo-generated input files for the four scenarios (PESTLA).



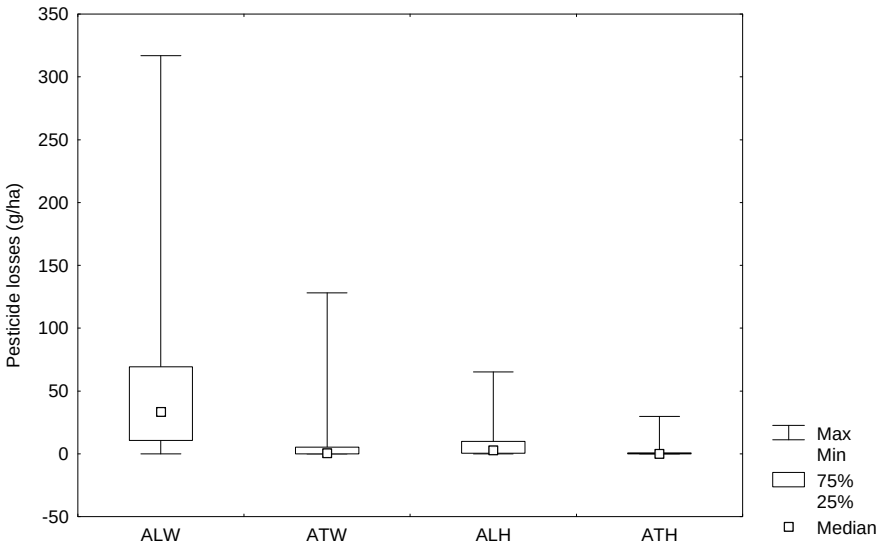
Appendix 224. Box plots presenting the mean, standard deviation and standard error of the mean for percolation values generated for the four scenarios (PESTLA)



Appendix 225. Box plots presenting the mean, standard deviation and standard error of the mean for values of pesticide losses generated for the four scenarios (PESTLA)



Appendix 226. Box plots presenting the median, the lower and upper quartiles and minimum and maximum values for percolation generated for the four scenarios (PESTLA)



Appendix 227. Box plots presenting the median, the lower and upper quartiles and minimum and maximum values for pesticide losses generated for the four scenarios (PESTLA)

Percolation		
Ranking	Parameter	Betas
1	CFTB	-0.8496
2	IR1	-0.2046
3	IF1	-0.1886
4	COFR	-0.1646
5	RSIG	0.1451
6	G3	0.0938
7	RDS	-0.0846
8	G2	-0.0578
9	GCTB	-0.0462
10	SUWA	0.0409
11	SUAI	0.0360
12	RDTB	-0.0358
13	ORG	0.0349
14	G4	-0.0333
15	G6	0.0280
16	EGCV	0.0244
17	SAVP	-0.0237
18	ENSL	0.0191
19	LEDS	0.0189
20	PSA	-0.0186
21	KOM	0.0183
22	THAI	-0.0173
23	TEMI	-0.0140
24	BD	0.0131
25	G1	0.0127
26	RDD	0.0113
27	CFUP	0.0101
28	CFLI	-0.0084
29	FREU	0.0073
30	HI	0.0052
31	ENVP	-0.0020
32	DEG	-0.0009

Pesticide losses		
Ranking	Parameter	Betas
1	DEG	0.6633
2	KOM	-0.5680
3	FREU	0.3333
4	EGCV	0.3110
5	LEDS	0.2532
6	G2	-0.0883
7	ORG	-0.0878
8	G3	0.0676
9	BD	-0.0636
10	SUWA	0.0344
11	IF1	-0.0303
12	G6	0.0294
13	IR1	0.0287
14	CFUP	-0.0283
15	THAI	0.0269
16	CFLI	-0.0259
17	RSIG	0.0232
18	SAVP	-0.0147
19	G4	0.0134
20	G1	-0.0129
21	COFR	0.0118
22	PSA	0.0093
23	RDD	-0.0076
24	RDTB	0.0070
25	TEMI	0.0067
26	SUAI	-0.0064
27	RDS	0.0055
28	ENVP	-0.0053
29	HI	-0.0015
30	ENSL	-0.0006
31	GCTB	0.0004
32	CFTB	-0.0003

Appendix 228. Classification of PESTLA parameters according to their influence on percolation and pesticide losses, using the betas derived from a multiple linear regression on ranked data *Pesticide L on Wick* scenario

Percolation		
Ranking	Parameter	Betas
1	CFTB	-0.8908
2	IR1	-0.2188
3	IF1	-0.2181
4	COFR	-0.1988
5	RSIG	0.1539
6	RDTB	-0.0690
7	G2	-0.0620
8	G3	0.0590
9	RDS	-0.0564
10	SUWA	0.0362
11	GCTB	-0.0336
12	ENSL	0.0314
13	LEDS	-0.0297
14	EGCV	0.0284
15	SAVP	-0.0206
16	ORG	0.0166
17	PSA	-0.0153
18	BD	0.0138
19	G1	0.0132
20	RDD	-0.0130
21	SUAI	-0.0130
22	G4	0.0099
23	ENVP	-0.0092
24	THAI	0.0068
25	KOM	0.0056
26	TEMI	0.0055
27	CFLI	0.0051
28	DEG	0.0046
29	FREU	-0.0041
30	G6	0.0041
31	HI	-0.0016
32	CFUP	-0.0010

Pesticide losses		
Ranking	Parameter	Betas
1	FREU	0.5750
2	KOM	-0.4917
3	DEG	0.3746
4	LEDS	0.2041
5	EGCV	0.1337
6	ORG	-0.0998
7	BD	-0.0901
8	G4	-0.0632
9	CFUP	0.0362
10	COFR	-0.0306
11	CFLI	0.0252
12	HI	0.0212
13	G3	0.0210
14	RDS	-0.0210
15	CFTB	0.0206
16	G6	0.0200
17	RSIG	0.0171
18	TEMI	0.0168
19	RDTB	-0.0155
20	SUWA	0.0153
21	PSA	-0.0153
22	SUAI	-0.0113
23	THAI	0.0110
24	RDD	-0.0105
25	IR1	-0.0103
26	GCTB	0.0080
27	ENVP	-0.0068
28	G2	0.0045
29	SAVP	0.0042
30	G1	0.0040
31	ENSL	-0.0008
32	IF1	0.0002

Appendix 229. Classification of PESTLA parameters according to their influence on percolation and pesticide losses, using the betas derived from a multiple linear regression on ranked data *Pesticide T on Wick* scenario

Percolation		
Ranking	Parameter	Betas
1	CFTB	-0.8454
2	RSIG	0.2692
3	COFR	-0.2429
4	IF1	-0.1568
5	IR1	-0.1320
6	GCTB	-0.0604
7	G3	0.0394
8	DEG	0.0281
9	LEDS	-0.0229
10	SAVP	0.0207
11	PSA	0.0196
12	G6	-0.0194
13	CFUP	0.0193
14	TEMI	0.0179
15	RDS	-0.0169
16	SUAI	0.0159
17	ENVP	-0.0158
18	BD	-0.0152
19	RDTB	-0.0118
20	SUWA	-0.0108
21	G2	-0.0095
22	EGCV	0.0092
23	THAI	-0.0086
24	ORG	0.0076
25	ENSL	-0.0071
26	G1	0.0058
27	CFLI	-0.0040
28	HI	0.0035
29	G4	-0.0009
30	RDD	0.0006
31	KOM	0.0005
32	FREU	0.0002

Pesticide losses		
Ranking	Parameter	Betas
1	DEG	0.5904
2	LEDS	0.4654
3	KOM	-0.4630
4	FREU	0.3528
5	EGCV	0.2495
6	G2	-0.0984
7	G6	0.0897
8	SUWA	0.0798
9	GCTB	-0.0525
10	ORG	-0.0494
11	BD	-0.0484
12	PSA	-0.0448
13	IR1	-0.0377
14	SAVP	0.0347
15	THAI	-0.0274
16	G3	0.0268
17	TEMI	-0.0222
18	CFLI	-0.0220
19	SUAI	-0.0216
20	ENSL	-0.0214
21	G4	-0.0200
22	RDTB	0.0166
23	RSIG	0.0165
24	CFUP	0.0161
25	IF1	0.0137
26	HI	0.0134
27	G1	-0.0103
28	CFTB	-0.0088
29	RDD	-0.0061
30	ENVP	-0.0049
31	COFR	0.0023
32	RDS	0.0023

Appendix 230. Classification of PESTLA parameters according to their influence on percolation and pesticide losses, using the betas derived from a multiple linear regression on ranked data *Pesticide L on Hodnet* scenario

Percolation		
Ranking	Parameter	Betas
1	CFTB	-0.8762
2	RSIG	0.2783
3	COFR	-0.2357
4	IR1	-0.1848
5	IF1	-0.1468
6	GCTB	-0.0613
7	RDD	-0.0599
8	SAVP	0.0474
9	CFLI	-0.0411
10	CFUP	-0.0398
11	ENSL	0.0351
12	TEMI	-0.0224
13	EGCV	-0.0173
14	ENVP	0.0173
15	G3	0.0120
16	SUAI	0.0103
17	G1	-0.0102
18	HI	0.0081
19	SUWA	-0.0076
20	G4	0.0076
21	BD	-0.0066
22	FREU	0.0065
23	RDTB	0.0065
24	G2	-0.0044
25	PSA	-0.0041
26	THAI	0.0026
27	G6	-0.0026
28	RDS	0.0023
29	LEDS	-0.0019
30	ORG	0.0012
31	DEG	-0.0011
32	KOM	0.0001

Pesticide losses		
Ranking	Parameter	Betas
1	FREU	0.6601
2	KOM	-0.4610
3	DEG	0.4500
4	LEDS	0.2139
5	EGCV	0.1462
6	ORG	-0.0759
7	G6	0.0544
8	RSIG	0.0534
9	BD	-0.0481
10	G2	-0.0473
11	THAI	-0.0438
12	CFLI	0.0404
13	IR1	-0.0374
14	CFTB	-0.0356
15	COFR	-0.0341
16	RDTB	0.0262
17	SUAI	-0.0254
18	G1	-0.0220
19	HI	0.0219
20	G3	0.0218
21	SUWA	0.0209
22	PSA	-0.0202
23	GCTB	-0.0195
24	G4	0.0179
25	ENSL	-0.0175
26	RDD	0.0103
27	RDS	-0.0083
28	TEMI	-0.0059
29	CFUP	0.0046
30	SAVP	0.0036
31	ENVP	-0.0021
32	IF1	-0.0007

Appendix 231. Classification of PESTLA parameters according to their influence on percolation and pesticide losses, using the betas derived from a multiple linear regression on ranked data *Pesticide T on Hodnet* scenario

	ALW		ATW		ALH		ATH	
	Beta	Rank	Beta	Rank	Beta	Rank	Beta	Rank
G1	0.0142	22	0.0222	17	-0.0017	29	0.0017	32
G2	-0.0623	8	-0.0449	9	0.0028	27	-0.0046	28
G3	0.0962	6	0.0674	7	0.0188	14	0.0139	20
G4	-0.0205	20	-0.0060	28	-0.0150	17	0.0154	17
G6	-0.0060	27	0.0136	21	-0.0376	9	-0.0036	30
COFR	-0.1855	4	-0.2112	3	-0.2396	3	-0.2417	3
RSIG	0.1409	5	0.1608	5	0.2659	2	0.2699	2
PSA	-0.0177	21	-0.0313	12	0.0031	26	-0.0051	26
ORG	0.0609	9	0.0304	13	-0.0007	31	0.0188	14
RDS	-0.0727	7	-0.0270	14	-0.0289	11	-0.0172	16
HI	-0.0210	19	-0.0038	30	0.0003	32	0.0092	22
TEMI	-0.0415	15	0.0006	32	0.0185	16	-0.0214	13
IF1	-0.2123	2	-0.2099	4	-0.1666	4	-0.1271	5
IR1	-0.2005	3	-0.2152	2	-0.1544	5	-0.1870	4
GCTB	-0.0539	10	-0.0596	8	-0.0511	6	-0.0607	6
CFTB	-0.8256	1	-0.8904	1	-0.8432	1	-0.8822	1
RDTB	-0.0525	11	-0.0927	6	-0.0310	10	-0.0041	29
RDD	-0.0062	26	-0.0201	20	-0.0033	25	-0.0278	9
BD	0.0136	23	0.0213	18	-0.0194	13	0.0102	21
LEDS	0.0038	29	-0.0022	31	-0.0484	8	0.0030	31
THAI	-0.0229	17	-0.0091	26	-0.0256	12	-0.0150	18
SUWA	0.0474	14	0.0051	29	-0.0113	19	-0.0050	27
SUAI	0.0227	18	-0.0210	19	0.0073	21	0.0089	23
ENSL	0.0051	28	0.0438	10	0.0104	20	0.0236	12
SAVP	-0.0524	12	-0.0337	11	0.0064	22	0.0249	11
ENVP	-0.0067	25	-0.0235	15	0.0020	28	0.0251	10
CFUP	0.0003	31	-0.0129	24	0.0035	24	-0.0295	7
DEG	-0.0370	16	0.0223	16	0.0501	7	-0.0057	24
EGCV	-0.0001	32	0.0076	27	-0.0047	23	-0.0176	15
CFLI	-0.0026	30	0.0129	23	0.0016	30	-0.0295	8
KOM	0.0484	13	-0.0100	25	-0.0146	18	0.0144	19
FREU	-0.0129	24	0.0129	22	0.0187	15	0.0057	25

Appendix 232. Sensitivity of percolation in PESTLA
as calculated from the untransformed data for the four scenarios.

Betas are the coefficients of a normalised regression

The ranking has been performed on absolute betas

	ALW		ATW		ALH		ATH	
	Beta	Rank	Beta	Rank	Beta	Rank	Beta	Rank
G1	-0.0298	17	0.0162	25	0.0105	26	-0.0541	13
G2	-0.0774	8	0.0562	17	-0.1367	6	0.0022	31
G3	0.0807	7	-0.0181	22	0.0589	10	0.0284	22
G4	0.0187	22	0.0392	20	-0.0569	11	0.0464	15
G6	0.0215	20	0.0145	26	-0.0135	24	0.0393	18
COFR	-0.0603	12	-0.0035	30	0.0084	28	0.0564	10
RSIG	-0.0080	27	0.1174	6	0.0708	9	-0.0321	21
PSA	-0.0045	30	-0.0165	23	0.0059	30	-0.0348	20
ORG	-0.1010	6	-0.0545	18	0.0241	22	-0.0839	8
RDS	-0.0044	31	-0.0920	8	-0.0072	29	0.0503	14
HI	0.0029	32	0.0006	32	-0.0355	17	-0.1055	7
TEMI	-0.0556	13	0.0014	31	-0.0882	7	0.0170	26
IF1	-0.0359	15	0.0377	21	-0.0134	25	0.0265	25
IR1	-0.0352	16	-0.0100	28	-0.0307	20	0.1264	5
GCTB	-0.0710	9	0.0165	24	0.0400	15	0.0266	24
CFTB	0.0064	28	0.0109	27	-0.0429	13	-0.0280	23
RDTB	0.0252	18	0.0695	13	-0.0493	12	0.0082	28
RDD	-0.0131	24	-0.0985	7	-0.0327	18	0.0011	32
BD	-0.0636	11	-0.0870	9	-0.0313	19	-0.0028	30
LEDS	0.1886	5	0.0789	11	0.3263	3	0.1972	4
THAI	0.0123	26	0.0789	10	0.0055	31	0.0424	17
SUWA	-0.0229	19	-0.0457	19	0.0054	32	0.0385	19
SUAI	0.0657	10	-0.0074	29	0.0179	23	0.0558	11
ENSL	-0.0435	14	0.0652	14	0.0817	8	-0.0051	29
SAVP	-0.0197	21	0.0780	12	0.0088	27	-0.0542	12
ENVP	0.0126	25	-0.1217	5	0.0305	21	-0.0451	16
CFUP	0.0158	23	-0.0614	15	-0.0387	16	-0.0760	9
DEG	0.6925	1	0.4583	1	0.5901	1	0.4528	1
EGCV	0.2610	3	0.1785	4	0.2690	4	0.1099	6
CFLI	0.0056	29	0.0577	16	-0.0404	14	-0.0141	27
KOM	-0.4568	2	-0.3899	2	-0.3793	2	-0.2693	3
FREU	0.2371	4	0.2961	3	0.2486	5	0.3132	2

Appendix 233. Sensitivity of pesticide losses in PESTLA as calculated from the untransformed data for the four scenarios.

Betas are the coefficients of a normalised regression

The ranking has been performed on absolute betas

	ALW		ATW		ALH		ATH	
	Beta	Rank	Beta	Rank	Beta	Rank	Beta	Rank
G1	0.0127	25	0.0132	19	0.0058	26	-0.0102	17
G2	-0.0578	8	-0.0620	7	-0.0095	21	-0.0044	24
G3	0.0938	6	0.0590	8	0.0394	7	0.0120	15
G4	-0.0333	14	0.0099	22	-0.0009	29	0.0076	20
G6	0.0280	15	0.0041	30	-0.0194	12	-0.0026	27
COFR	-0.1646	4	-0.1988	4	-0.2429	3	-0.2357	3
RSIG	0.1451	5	0.1539	5	0.2692	2	0.2783	2
PSA	-0.0186	20	-0.0153	17	0.0196	11	-0.0041	25
ORG	0.0349	13	0.0166	16	0.0076	24	0.0012	30
RDS	-0.0846	7	-0.0564	9	-0.0169	15	0.0023	28
HI	0.0052	30	-0.0016	31	0.0035	28	0.0081	18
TEMI	-0.0140	23	0.0055	26	0.0179	14	-0.0224	12
IF1	-0.1886	3	-0.2181	3	-0.1568	4	-0.1468	5
IR1	-0.2046	2	-0.2188	2	-0.1320	5	-0.1848	4
GCTB	-0.0462	9	-0.0336	11	-0.0604	6	-0.0613	6
CFTB	-0.8496	1	-0.8908	1	-0.8454	1	-0.8762	1
RDTB	-0.0358	12	-0.0690	6	-0.0118	19	0.0065	23
RDD	0.0113	26	-0.0130	20	0.0006	30	-0.0599	7
BD	0.0131	24	0.0138	18	-0.0152	18	-0.0066	21
LEDS	0.0189	19	-0.0297	13	-0.0229	9	-0.0019	29
THAI	-0.0173	22	0.0068	24	-0.0086	23	0.0026	26
SUWA	0.0409	10	0.0362	10	-0.0108	20	-0.0076	19
SUAI	0.0360	11	-0.0130	21	0.0159	16	0.0103	16
ENSL	0.0191	18	0.0314	12	-0.0071	25	0.0351	11
SAVP	-0.0237	17	-0.0206	15	0.0207	10	0.0474	8
ENVP	-0.0020	31	-0.0092	23	-0.0158	17	0.0173	14
CFUP	0.0101	27	-0.0010	32	0.0193	13	-0.0398	10
DEG	-0.0009	32	0.0046	28	0.0281	8	-0.0011	31
EGCV	0.0244	16	0.0284	14	0.0092	22	-0.0173	13
CFLI	-0.0084	28	0.0051	27	-0.0040	27	-0.0411	9
KOM	0.0183	21	0.0056	25	0.0005	31	0.0001	32
FREU	0.0073	29	-0.0041	29	0.0002	32	0.0065	22

Appendix 234. Sensitivity of percolation in PESTLA
as calculated from the transformed data for the four scenarios.

The transformation consisted in replacing parameter values by their rank

Betas are the coefficients of a normalised regression

The ranking has been performed on absolute betas

	ALW		ATW		ALH		ATH	
	Beta	Rank	Beta	Rank	Beta	Rank	Beta	Rank
G1	-0.0129	20	0.0040	30	-0.0103	27	-0.0220	18
G2	-0.0883	6	0.0045	28	-0.0984	6	-0.0473	10
G3	0.0676	8	0.0210	13	0.0268	16	0.0218	20
G4	0.0134	19	-0.0632	8	-0.0200	21	0.0179	24
G6	0.0294	12	0.0200	16	0.0897	7	0.0544	7
COFR	0.0118	21	-0.0306	10	0.0023	31	-0.0341	15
RSIG	0.0232	17	0.0171	17	0.0165	23	0.0534	8
PSA	0.0093	22	-0.0153	21	-0.0448	12	-0.0202	22
ORG	-0.0878	7	-0.0998	6	-0.0494	10	-0.0759	6
RDS	0.0055	27	-0.0210	14	0.0023	32	-0.0083	27
HI	-0.0015	29	0.0212	12	0.0134	26	0.0219	19
TEMI	0.0067	25	0.0168	18	-0.0222	17	-0.0059	28
IF1	-0.0303	11	0.0002	32	0.0137	25	-0.0007	32
IR1	0.0287	13	-0.0103	25	-0.0377	13	-0.0374	13
GCTB	0.0004	31	0.0080	26	-0.0525	9	-0.0195	23
CFTB	-0.0003	32	0.0206	15	-0.0088	28	-0.0356	14
RDTB	0.0070	24	-0.0155	19	0.0166	22	0.0262	16
RDD	-0.0076	23	-0.0105	24	-0.0061	29	0.0103	26
BD	-0.0636	9	-0.0901	7	-0.0484	11	-0.0481	9
LEDS	0.2532	5	0.2041	4	0.4654	2	0.2139	4
THAI	0.0269	15	0.0110	23	-0.0274	15	-0.0438	11
SUWA	0.0344	10	0.0153	20	0.0798	8	0.0209	21
SUAI	-0.0064	26	-0.0113	22	-0.0216	19	-0.0254	17
ENSL	-0.0006	30	-0.0008	31	-0.0214	20	-0.0175	25
SAVP	-0.0147	18	0.0042	29	0.0347	14	0.0036	30
ENVP	-0.0053	28	-0.0068	27	-0.0049	30	-0.0021	31
CFUP	-0.0283	14	0.0362	9	0.0161	24	0.0046	29
DEG	0.6633	1	0.3746	3	0.5904	1	0.4500	3
EGCV	0.3110	4	0.1337	5	0.2495	5	0.1462	5
CFLI	-0.0259	16	0.0252	11	-0.0220	18	0.0404	12
KOM	-0.5680	2	-0.4917	2	-0.4630	3	-0.4610	2
FREU	0.3333	3	0.5750	1	0.3528	4	0.6601	1

Appendix 235. Sensitivity of pesticide losses in PESTLA as calculated from the transformed data for the four scenarios.

The transformation consisted in replacing parameter values by their rank

Betas are the coefficients of a normalised regression

The ranking has been performed on absolute betas

	ALW		ATW		ALH		ATH	
	Beta	Rank	Beta	Rank	Beta	Rank	Beta	Rank
CFTB	-0.8496	1	-0.8908	1	-0.8454	1	-0.8762	1
RSIG	0.1451	5	0.1539	5	0.2692	2	0.2783	2
COFR	-0.1646	4	-0.1988	4	-0.2429	3	-0.2357	3
IR1	-0.2046	2	-0.2188	2	-0.1320	5	-0.1848	4
IF1	-0.1886	3	-0.2181	3	-0.1568	4	-0.1468	5
G3	0.0938	6	0.0590	8	0.0394	7	0.0120	15
GCTB	-0.0462	9	-0.0336	11	-0.0604	6	-0.0613	6
RDS	-0.0846	7	-0.0564	9	-0.0169	15	0.0023	28
G2	-0.0578	8	-0.0620	7	-0.0095	21	-0.0044	24
RDTB	-0.0358	12	-0.0690	6	-0.0118	19	0.0065	23
SAVP	-0.0237	17	-0.0206	15	0.0207	10	0.0474	8
SUWA	0.0409	10	0.0362	10	-0.0108	20	-0.0076	19
ENSL	0.0191	18	0.0314	12	-0.0071	25	0.0351	11
RDD	0.0113	26	-0.0130	20	0.0006	30	-0.0599	7
EGCV	0.0244	16	0.0284	14	0.0092	22	-0.0173	13
SUAI	0.0360	11	-0.0130	21	0.0159	16	0.0103	16
LEDS	0.0189	19	-0.0297	13	-0.0229	9	-0.0019	29
CFUP	0.0101	27	-0.0010	32	0.0193	13	-0.0398	10
ORG	0.0349	13	0.0166	16	0.0076	24	0.0012	30
TEMI	-0.0140	23	0.0055	26	0.0179	14	-0.0224	12
CFLI	-0.0084	28	0.0051	27	-0.0040	27	-0.0411	9
PSA	-0.0186	20	-0.0153	17	0.0196	11	-0.0041	25
G6	0.0280	15	0.0041	30	-0.0194	12	-0.0026	27
G4	-0.0333	14	0.0099	22	-0.0009	29	0.0076	20
BD	0.0131	24	0.0138	18	-0.0152	18	-0.0066	21
ENVP	-0.0020	31	-0.0092	23	-0.0158	17	0.0173	14
G1	0.0127	25	0.0132	19	0.0058	26	-0.0102	17
THAI	-0.0173	22	0.0068	24	-0.0086	23	0.0026	26
DEG	-0.0009	32	0.0046	28	0.0281	8	-0.0011	31
KOM	0.0183	21	0.0056	25	0.0005	31	0.0001	32
HI	0.0052	30	-0.0016	31	0.0035	28	0.0081	18
FREU	0.0073	29	-0.0041	29	0.0002	32	0.0065	22

Appendix 236. Classification of MACRO parameters according to their influence on percolation as determined from the betas of a multiple linear regression on the ranked data from the Monte Carlo sampling runs

The ranking was performed on absolute values of betas
A positive (resp. negative) beta means that an increase in the value of the parameter will result in an increase (resp. decrease) in percolation

	ALW		ATW		ALH		ATH	
	Beta	Rank	Beta	Rank	Beta	Rank	Beta	Rank
DEG	0.6633	1	0.3746	3	0.5904	1	0.4500	3
KOM	-0.5680	2	-0.4917	2	-0.4630	3	-0.4610	2
FREU	0.3333	3	0.5750	1	0.3528	4	0.6601	1
LEDS	0.2532	5	0.2041	4	0.4654	2	0.2139	4
EGCV	0.3110	4	0.1337	5	0.2495	5	0.1462	5
ORG	-0.0878	7	-0.0998	6	-0.0494	10	-0.0759	6
BD	-0.0636	9	-0.0901	7	-0.0484	11	-0.0481	9
G2	-0.0883	6	0.0045	28	-0.0984	6	-0.0473	10
G6	0.0294	12	0.0200	16	0.0897	7	0.0544	7
SUWA	0.0344	10	0.0153	20	0.0798	8	0.0209	21
G3	0.0676	8	0.0210	13	0.0268	16	0.0218	20
G4	0.0134	19	-0.0632	8	-0.0200	21	0.0179	24
IR1	0.0287	13	-0.0103	25	-0.0377	13	-0.0374	13
CFLI	-0.0259	16	0.0252	11	-0.0220	18	0.0404	12
RSIG	0.0232	17	0.0171	17	0.0165	23	0.0534	8
THAI	0.0269	15	0.0110	23	-0.0274	15	-0.0438	11
PSA	0.0093	22	-0.0153	21	-0.0448	12	-0.0202	22
CFUP	-0.0283	14	0.0362	9	0.0161	24	0.0046	29
GCTB	0.0004	31	0.0080	26	-0.0525	9	-0.0195	23
COFR	0.0118	21	-0.0306	10	0.0023	31	-0.0341	15
CFTB	-0.0003	32	0.0206	15	-0.0088	28	-0.0356	14
RDTB	0.0070	24	-0.0155	19	0.0166	22	0.0262	16
SUAI	-0.0064	26	-0.0113	22	-0.0216	19	-0.0254	17
HI	-0.0015	29	0.0212	12	0.0134	26	0.0219	19
SAVP	-0.0147	18	0.0042	29	0.0347	14	0.0036	30
TEMI	0.0067	25	0.0168	18	-0.0222	17	-0.0059	28
G1	-0.0129	20	0.0040	30	-0.0103	27	-0.0220	18
IF1	-0.0303	11	0.0002	32	0.0137	25	-0.0007	32
ENSL	-0.0006	30	-0.0008	31	-0.0214	20	-0.0175	25
RDS	0.0055	27	-0.0210	14	0.0023	32	-0.0083	27
RDD	-0.0076	23	-0.0105	24	-0.0061	29	0.0103	26
ENVP	-0.0053	28	-0.0068	27	-0.0049	30	-0.0021	31

Appendix 237. Classification of PESTLA parameters according to their influence on pesticide losses as determined from the betas of a multiple linear regression on the ranked data from the Monte Carlo sampling runs

The ranking was performed on absolute values of betas
A positive (resp. negative) beta means that an increase in the value of the parameter will result in an increase (resp. decrease) in pesticide losses

	Percolation		Pesticide losses	
	Non-ranked	Ranked	Non-ranked	Ranked
ALW	0.928	0.942	0.834	0.952
ATW	0.926	0.941	0.582	0.923
ALH	0.942	0.941	0.711	0.933
ATH	0.945	0.933	0.490	0.934

Appendix 238. Comparison of the results from the multiple linear regressions (R^2 values) for raw and transformed date for the four scenarios (PESTLA)

The transformation consisted in the replacement of values by their rank.