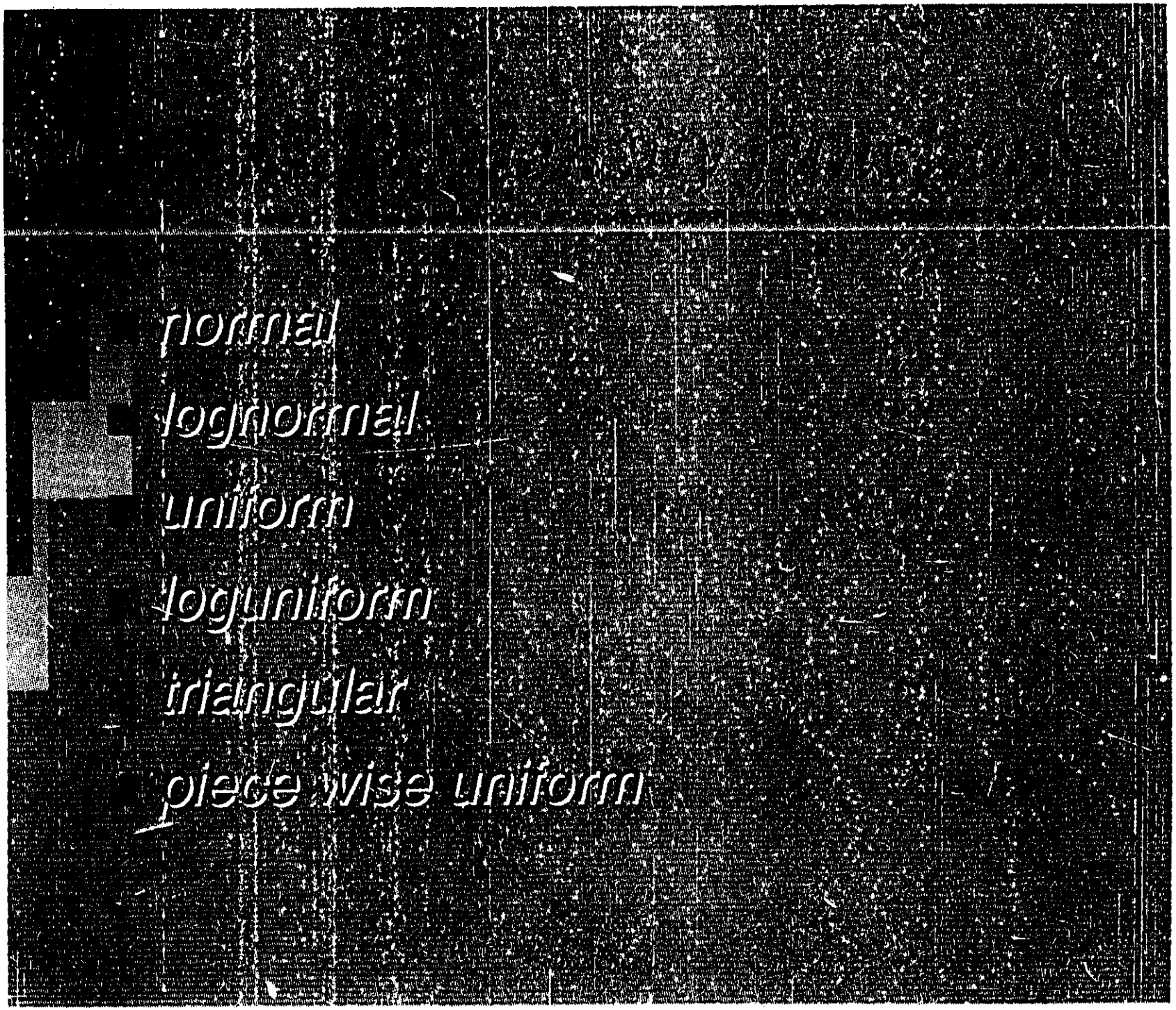
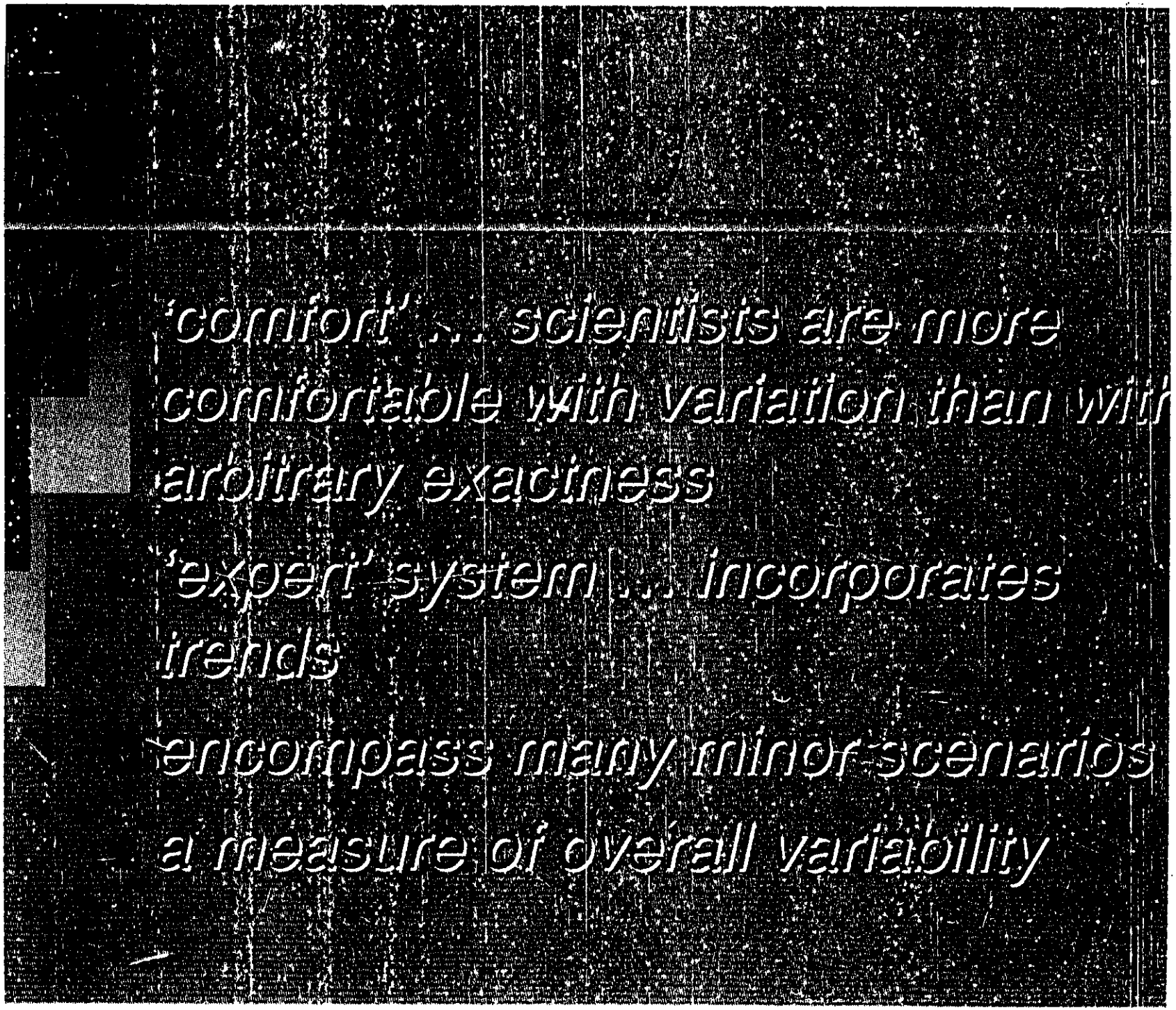

normal
lognormal
uniform
loguniform
triangular
piece wise uniform


'comfort' ... scientists are more
comfortable with variation than with
arbitrary exactness
'expert' system ... incorporates
trends
encompass many minor scenarios
a measure of overall variability

sums tend to be normally distributed

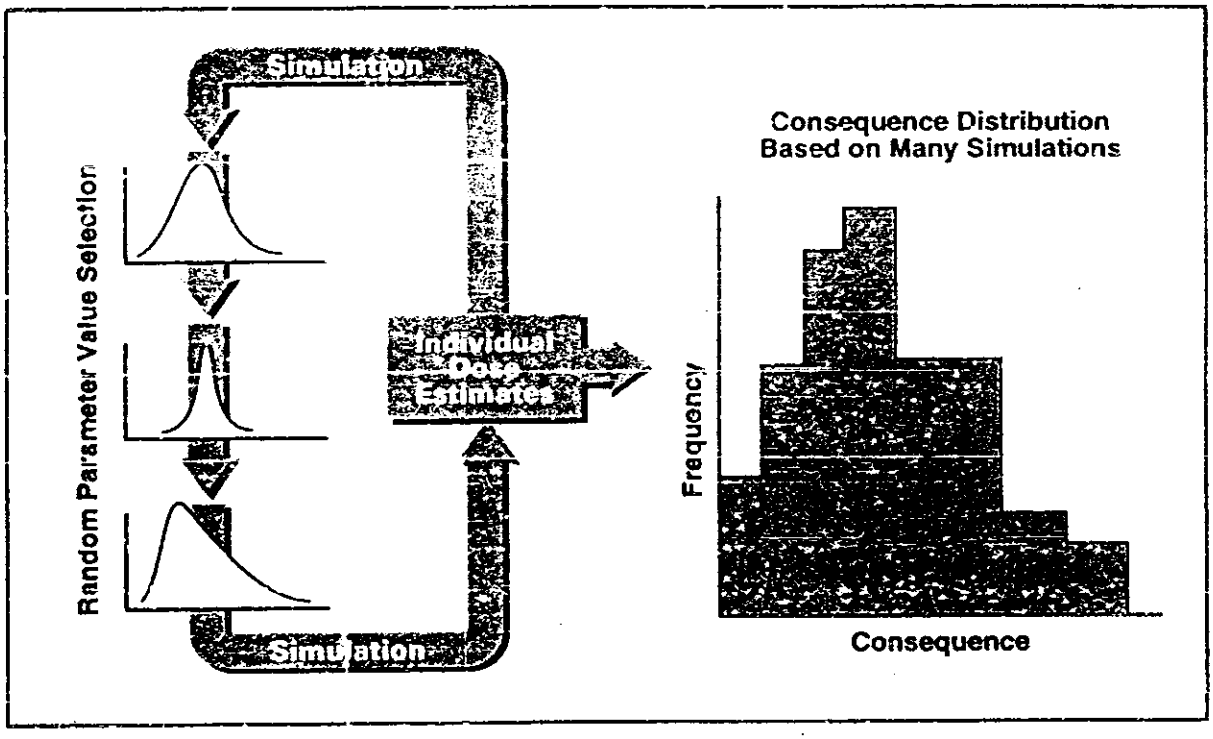
- organism and tissue weights
- dietary inputs

products tend to be lognormal

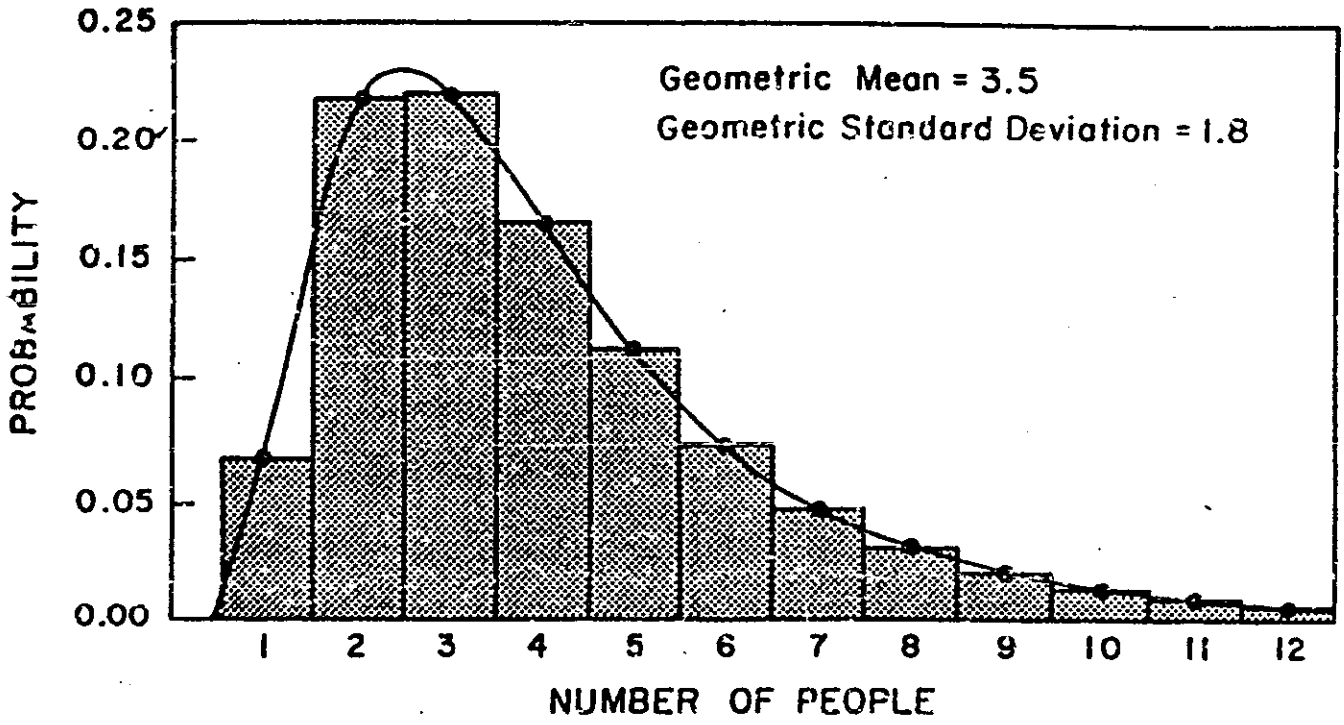
- Kd, concentration ratios
- environmental contaminant concentrations

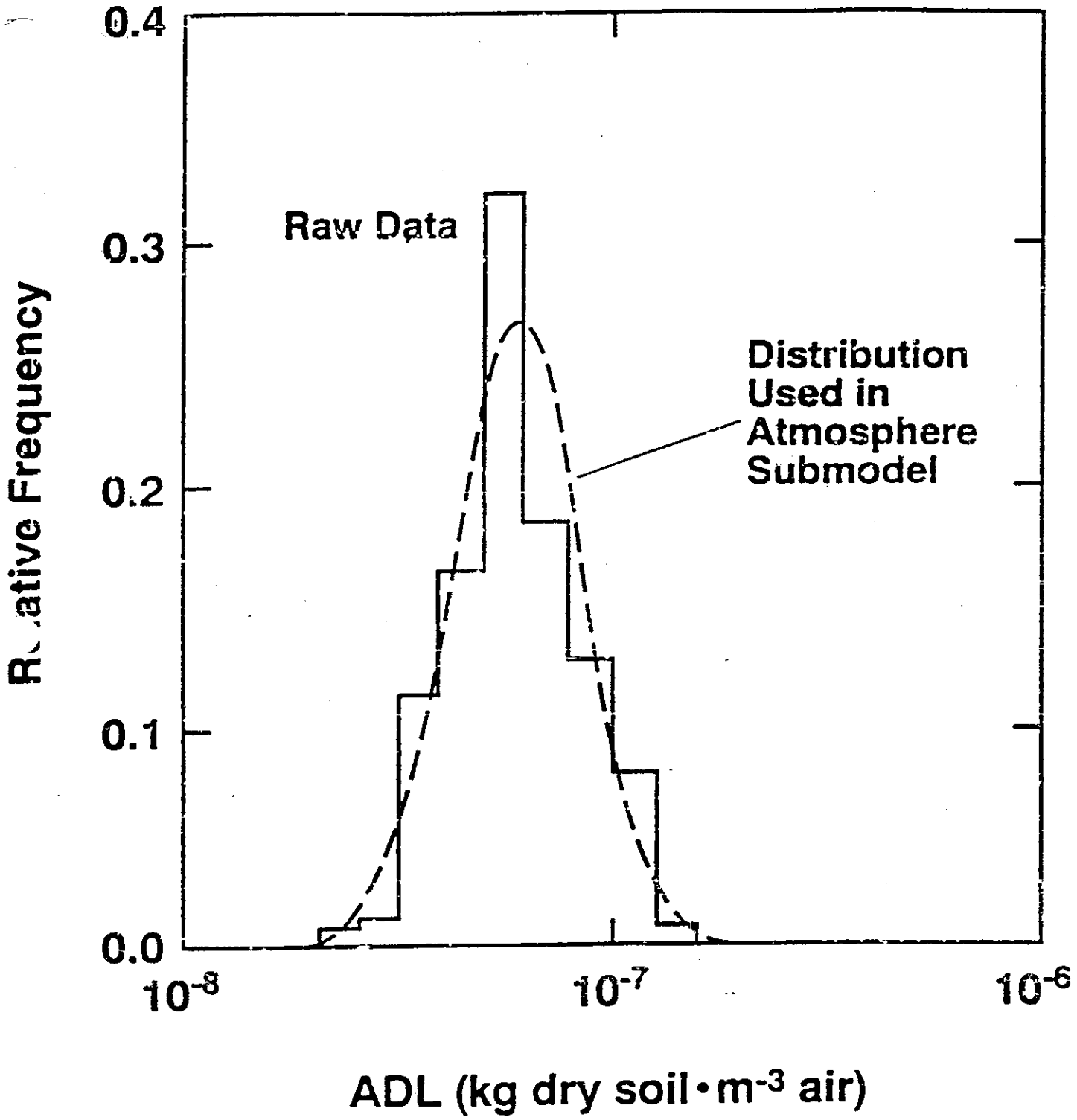
RF
6

Principles of Monte Carlo Simulation Showing Random Parameter Value Selection



SIZE OF THE CRITICAL GROUP




0.4
0.3
0.2
0.1
0.0
Raw Data
Distribution
Used in
Atmosphere
Submodel
10^{-8}
10^{-7}
10^{-6}
ADL (kg dry soil • m^{-3} air)

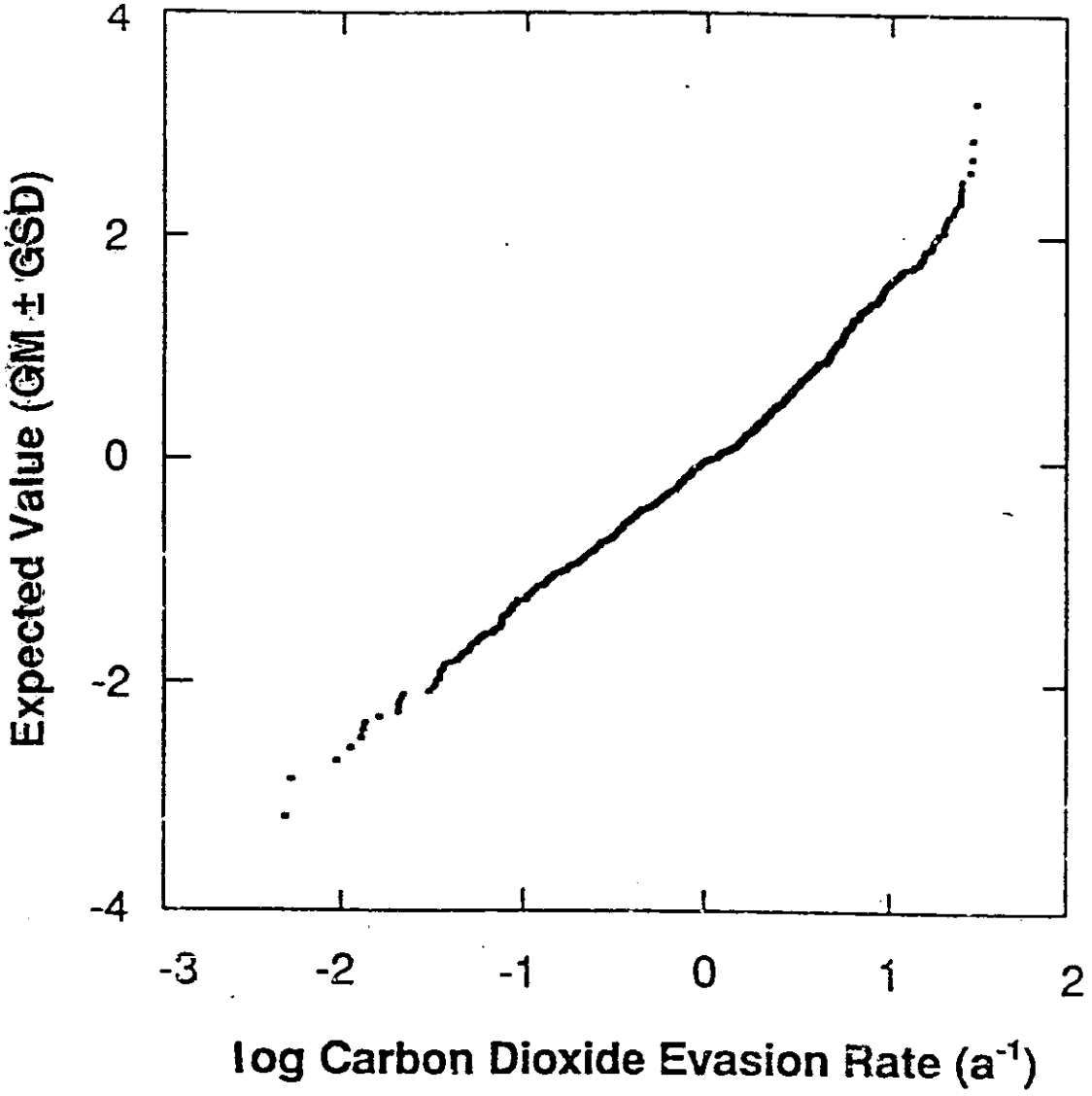
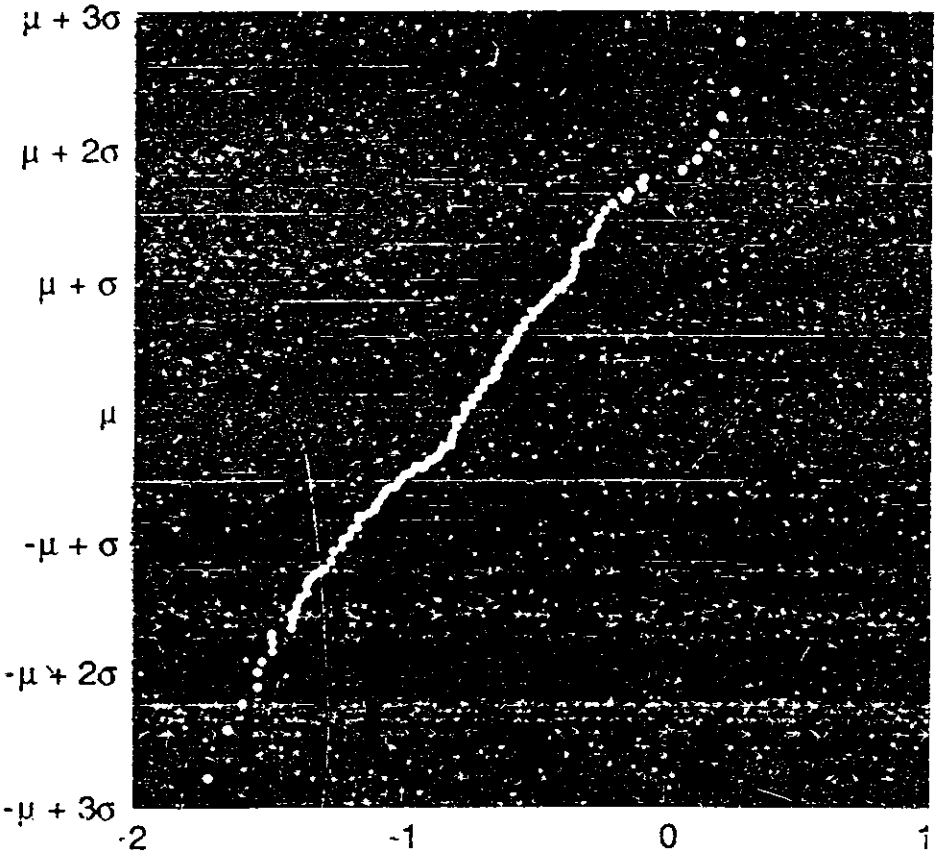


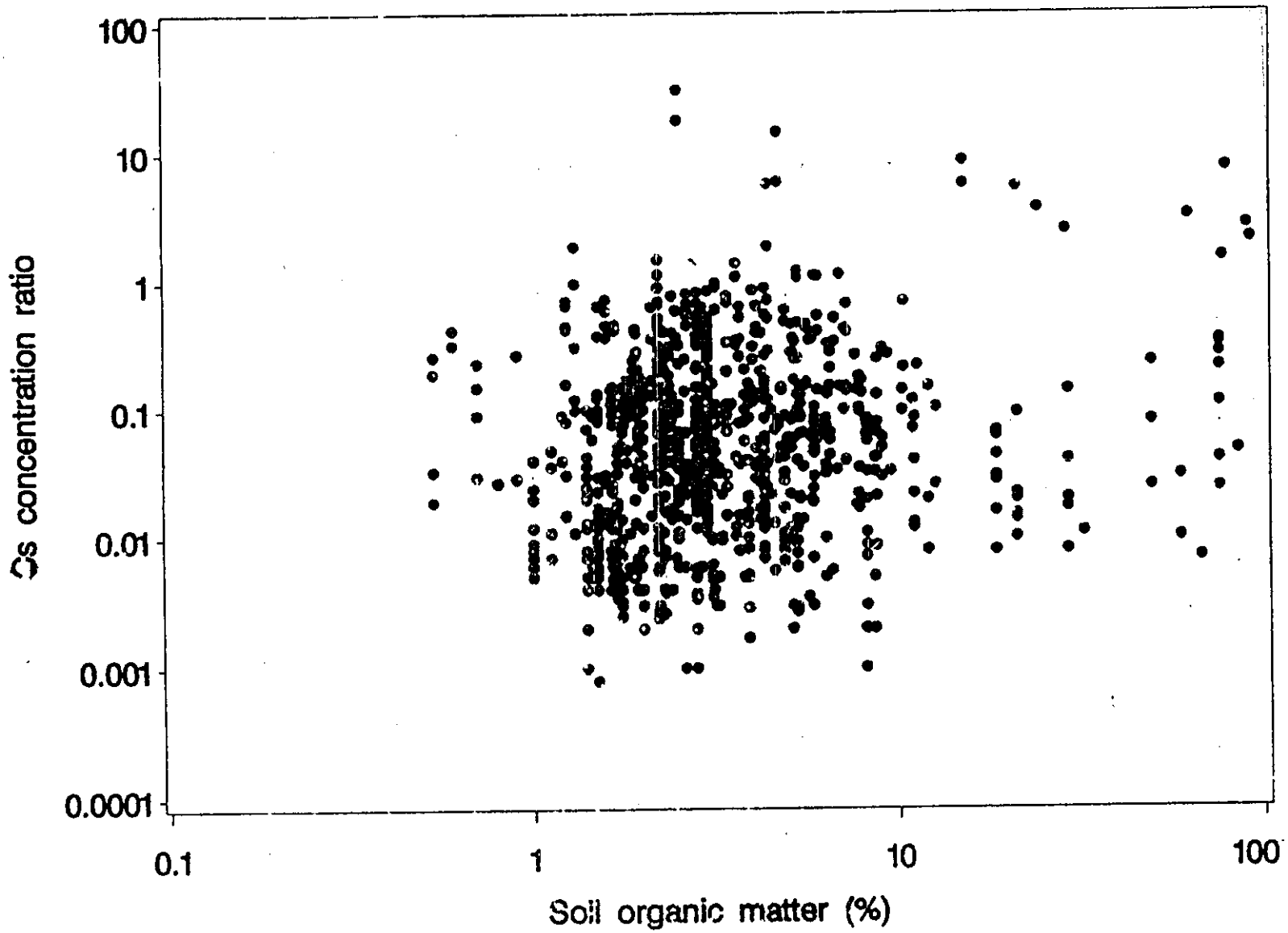
FIGURE 10: Probability Plot of the log-Transformed Gas Evasion Values Estimated for Shield Lakes. The nearly straight line indi a lognormal distribution.

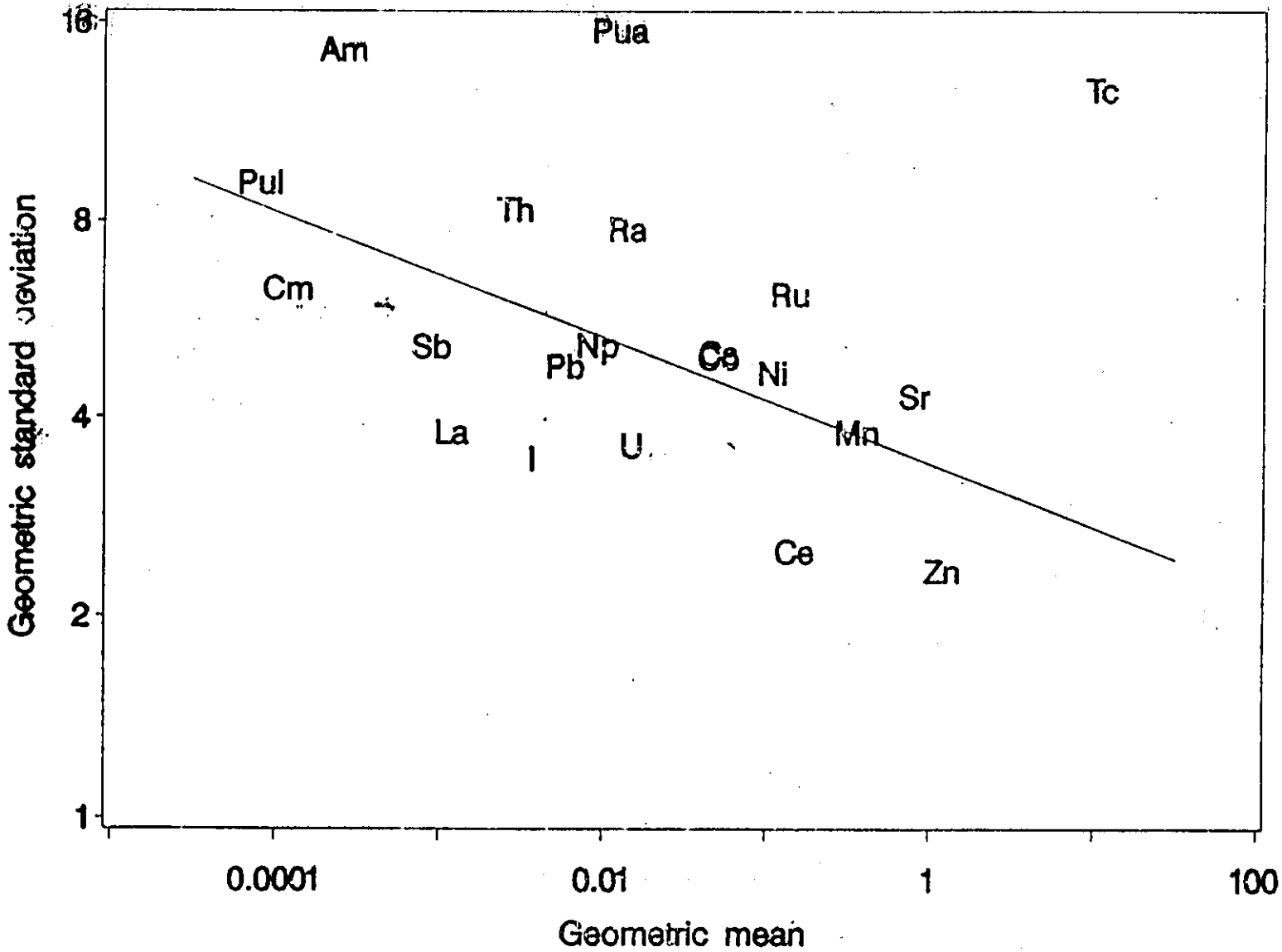
Probability Plot of Log Sedimentation Rate of Shield Lakes

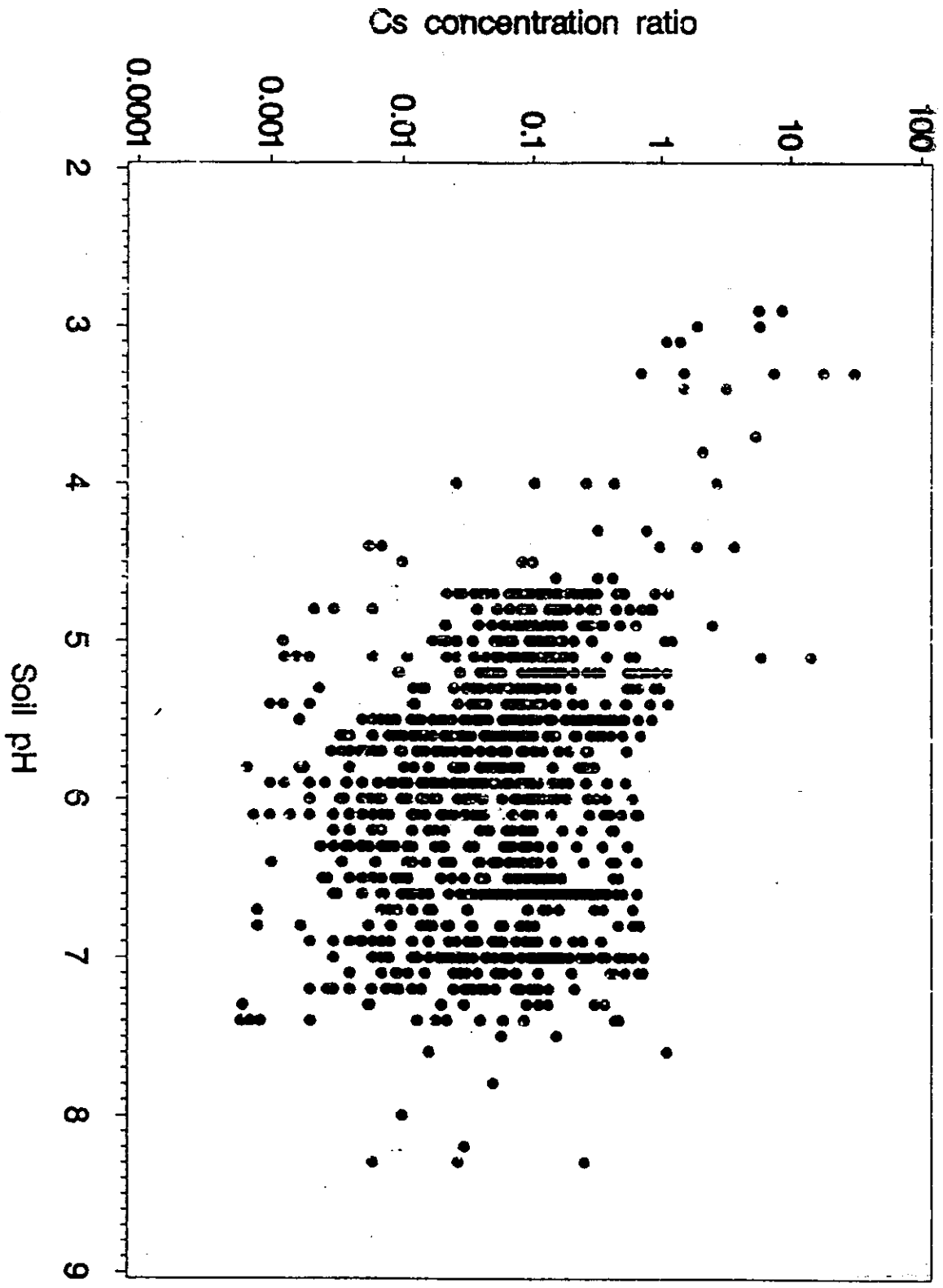
EIS 0-5.4

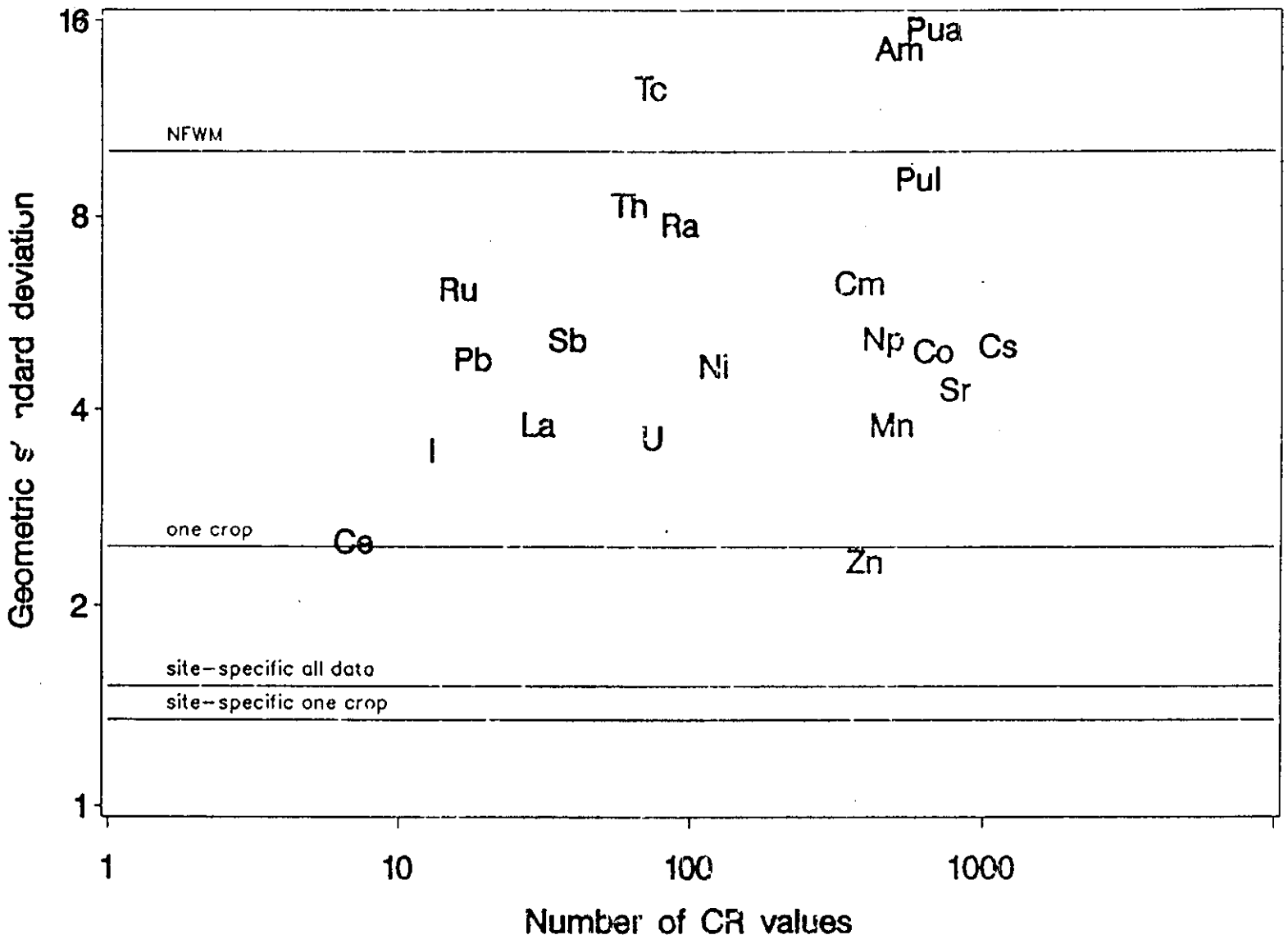


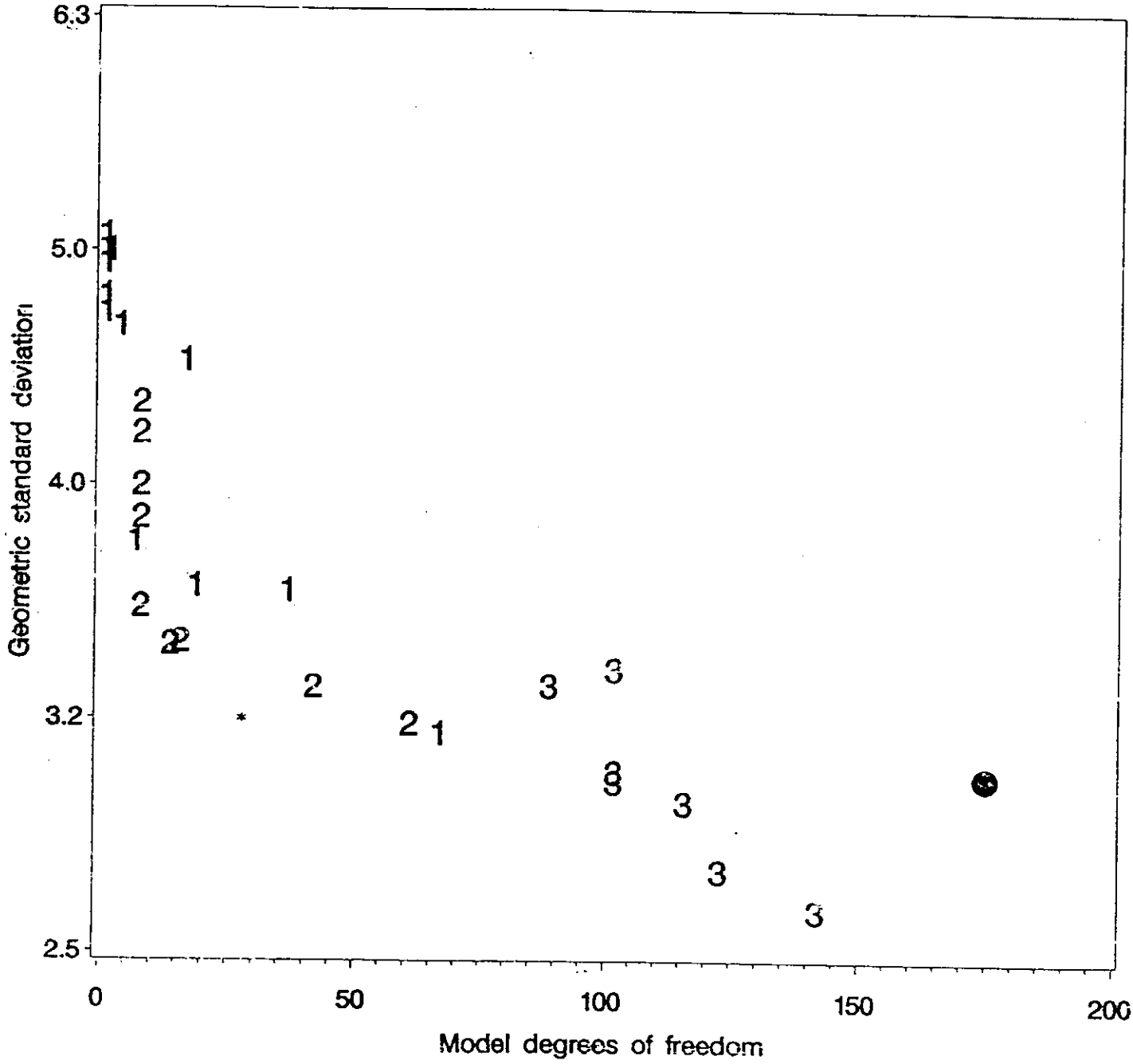
Geometric Mean 0.16 kg dry • m^{-2} • a^{-1}
Geometric Standard Deviation 2.48


100
10
1
0.1
0.01
0.001
0.0001
Cs concentration ratio
0.1
1
10
100
Soil organic matter (%)

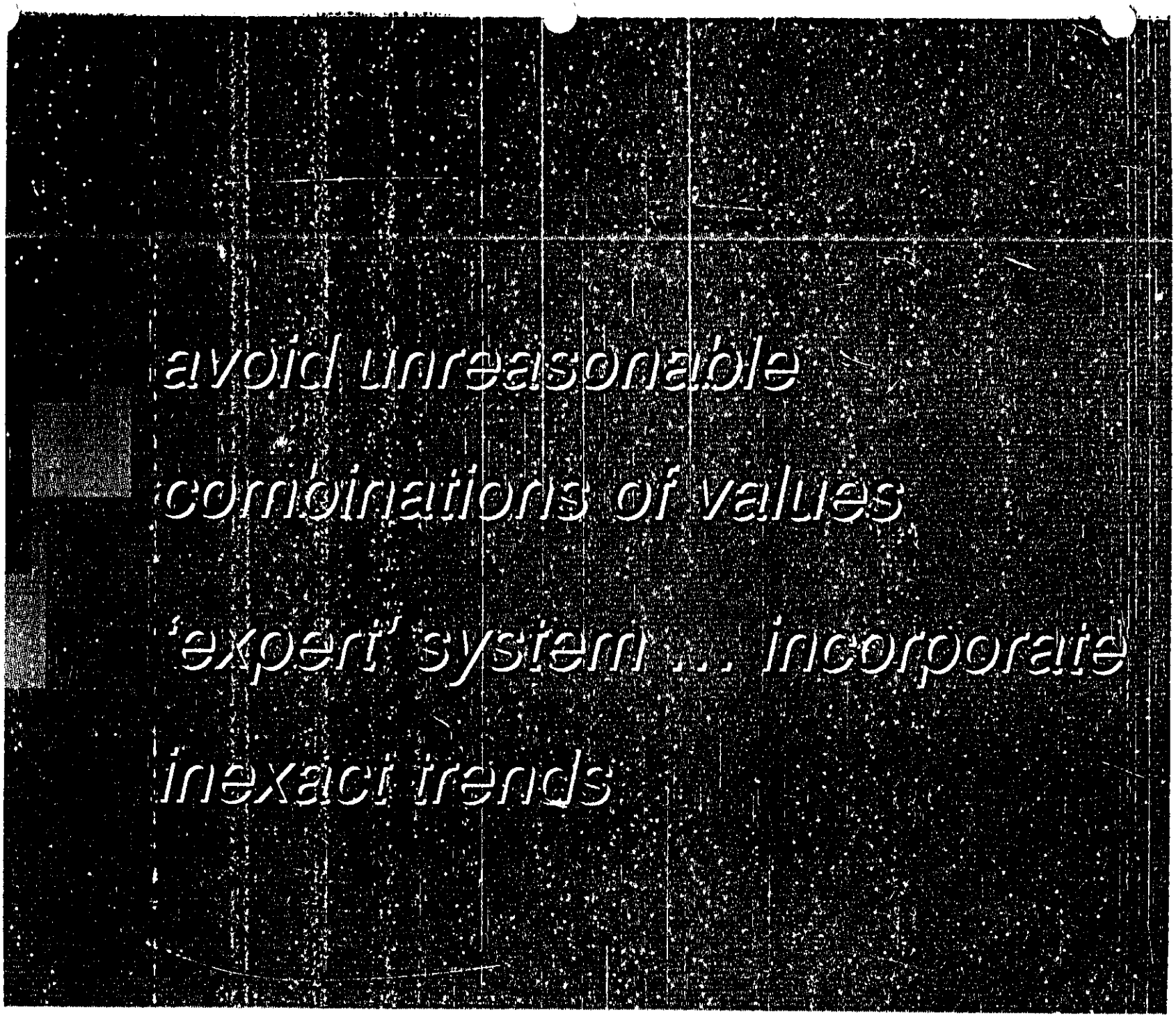

16
8
4
2
1
Geometric standard deviation
Am
Pua
Tc
Pul
Th
Ra
Cm
Ru
Sb
Np
Pb
Ce
Ni
Sr
La
I
U
Mn
Ce
Zn
0.0001
0.01
1
100
Geometric mean


Cs concentration ratio
0.0001
0.001
0.01
0.1
1
10
100
Soil pH
2
3
4
5
6
7
8
9


16
8
4
2
1
Geometric standard deviation
Pua
Am
Tc
NFWM
Pul
Th
Ra
Cm
Ru
Sb
Np
Co
Cs
Pb
Ni
Sr
La
Mn
U
I
one crop
Ce
Zn
site-specific all data
site-specific one crop
1
10
100
1000
Number of CR values


6.3
5.0
4.0
3.2
2.5
Geometric standard deviation
0
50
100
150
200
Model degrees of freedom


avoid impossible values
adhere to scenario assumption
remove very improbable values


avoid unreasonable
combinations of values
'expert' system ... incorporate
inexact trends

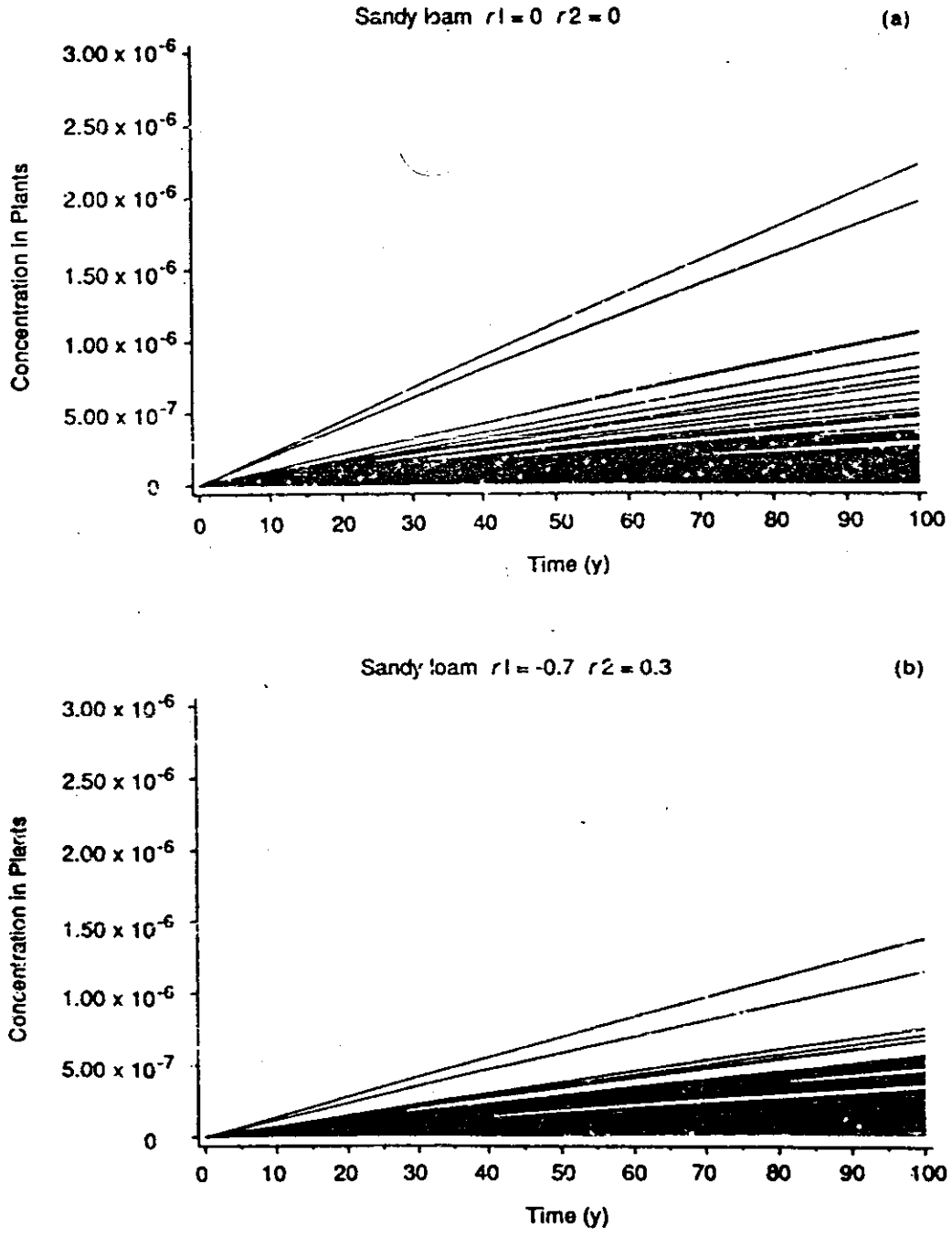
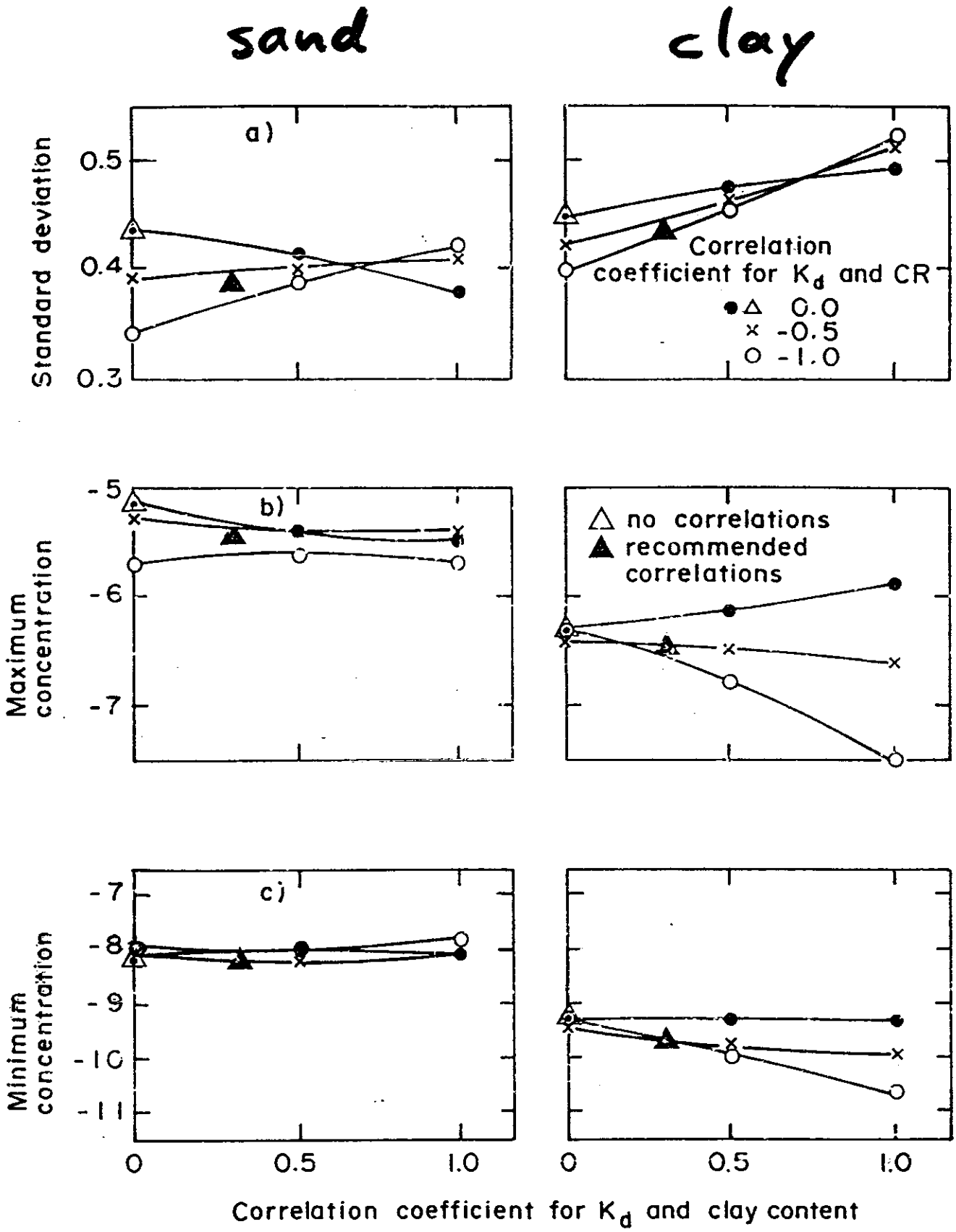
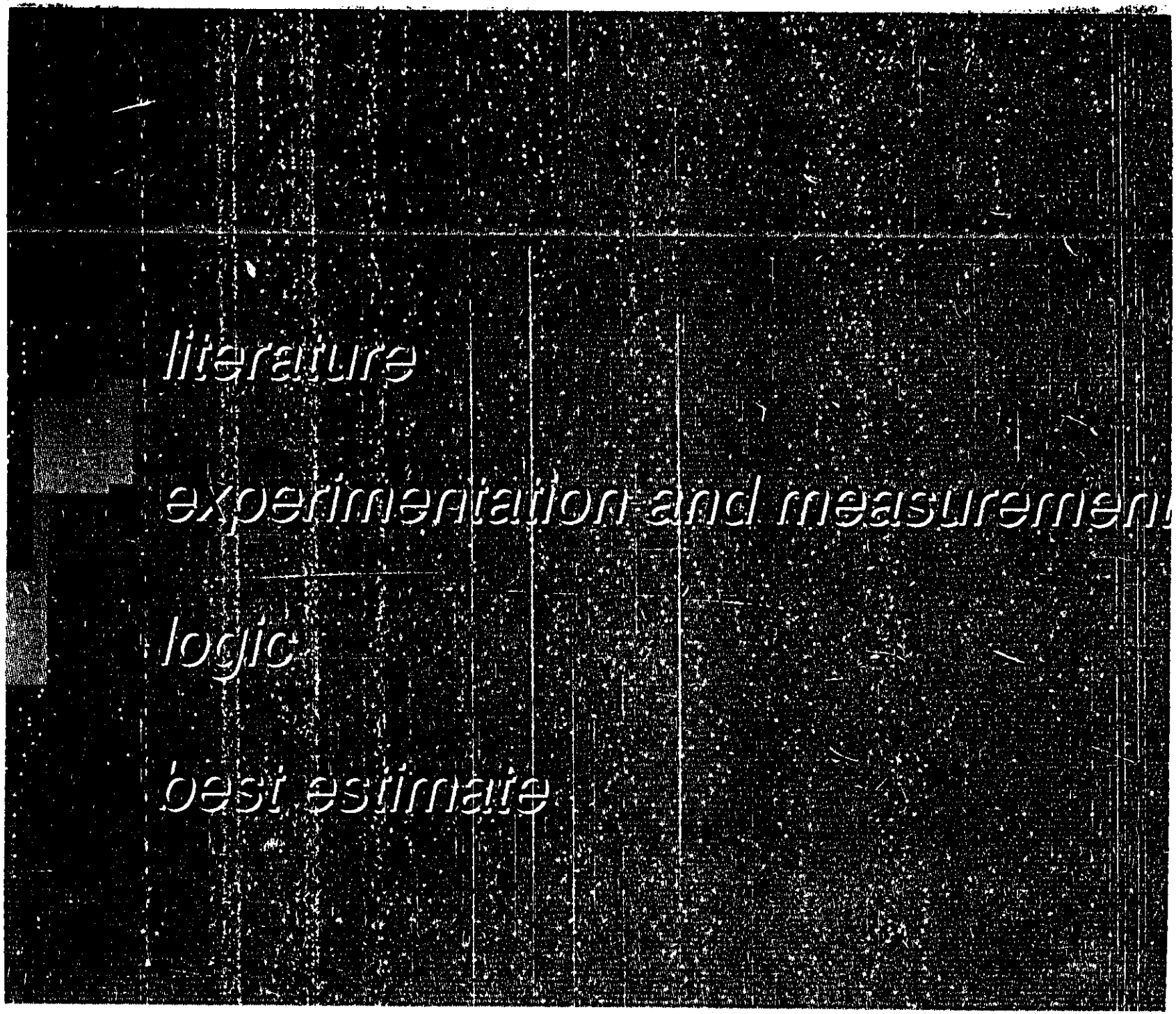


Fig. 1. Estimated plant concentration with time for a shallow sandy-loam soil over contaminated ground water for 1000 realizations, showing the effect of no parameter correlation (a) and the recommended parameter correlations (b). The coefficient $r1$ represents the correlation between CR and K_d, and $r2$ represents the correlation between K_d and soil texture.


sand
clay
a)
Standard deviation
0.5
0.4
0.3
Correlation coefficient for K_d and CR
0.0
-0.5
-1.0
b)
Maximum concentration
-5
-6
-7
no correlations
recommended correlations
c)
Minimum concentration
-7
-8
-9
-10
-11
0
0.5
1.0
Correlation coefficient for K_d and clay content


literature
experimentation and measurement
logic
best estimate

FEEDBACK ON ENVIRONMENTAL ASSESSMENT METHODOLOGY FROM EIS PARTICIPANTS

1. Full supporting data are needed to make an environmental assessment methodology credible

2. Physical, chemical, radiological and social stressors need to be integrated

3. Cumulative impacts need to be addressed

4. Monitoring needs to be considered as part of an environmental assessment methodology

5. Specific rather than generic organisms should be used

6. The most sensitive life stages of organisms should be used

7. An integrated ecological approach should be used considering components and functions

8. Model parameters should be based on wild and not domestic organisms

9. The environmental understanding and view of aboriginal peoples needs to be included

10. Multiple lines of reasoning or evidence are needed

Collective dose

- collective dose to a large popula
  not just individuals in the critical gro
- diff ors
- anti interested because
  coll eases with distance
- spec proach useful

ESTIMATED CONCENTRATION OF NON-RADIOACTIVE CONTAMINANTS

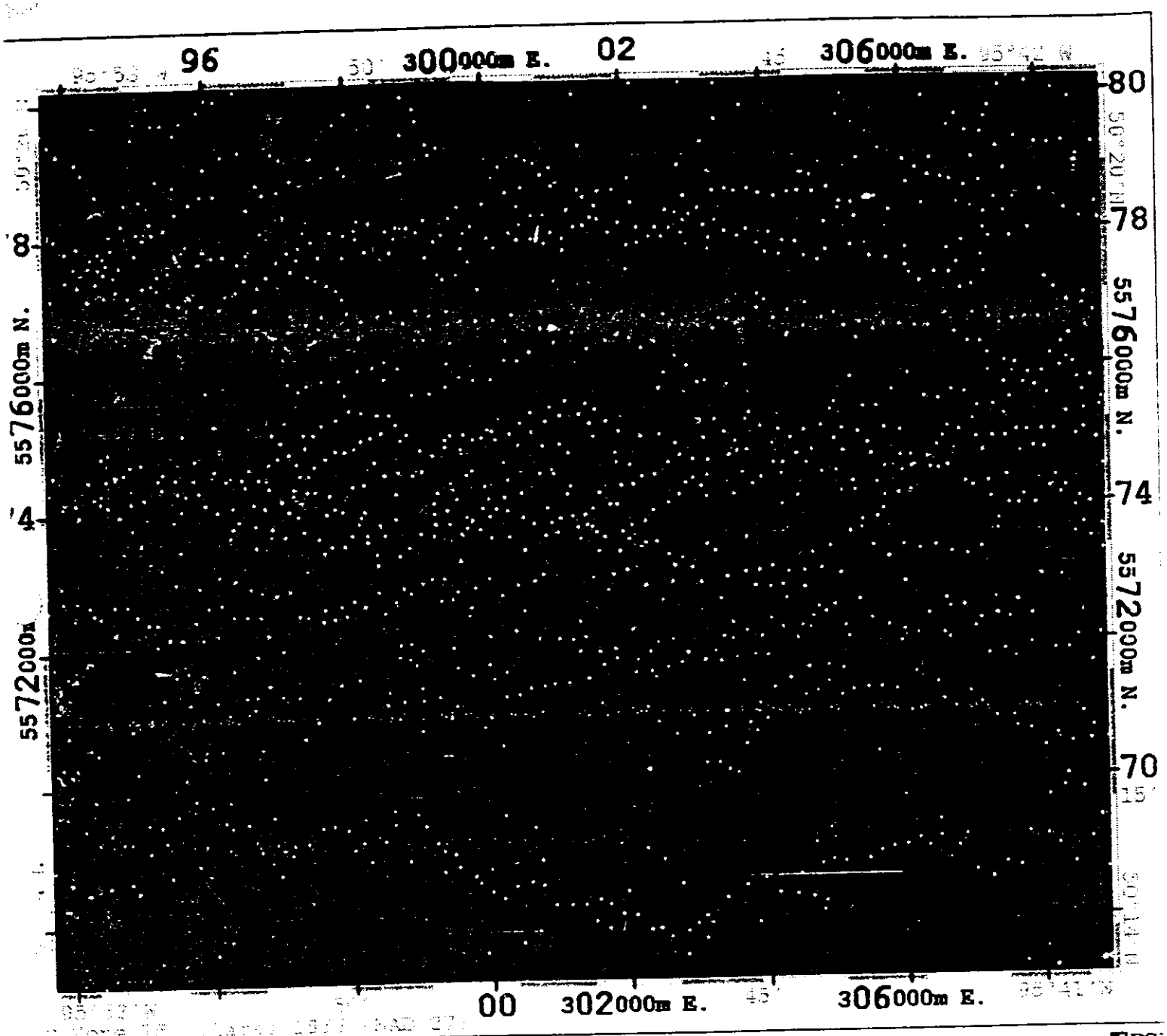
Contaminant	Garden Soil (mol/kg)	Well Water (mol/m^3)	Indoor Air (mol/m^3)
Antimony	2×10^{-18}	1×10^{-17}	$<10^{-20}$
Bromine	3×10^{-9}	2×10^{-9}	2×10^{-16}
Cadmium	$<10^{-20}$	$<10^{-20}$	$<10^{-20}$
Cesium	$<10^{-20}$	$<10^{-20}$	$<10^{-20}$
Chromium	$<10^{-20}$	$<10^{-20}$	$<10^{-20}$
Molybdenum	$<10^{-20}$	$<10^{-20}$	$<10^{-20}$
Samarium	$<10^{-20}$	$<10^{-20}$	$<10^{-20}$
Selenium	$<10^{-20}$	$<10^{-20}$	$<10^{-20}$
Technetium	$<10^{-20}$	$<10^{-20}$	$<10^{-20}$

Values are mean maxima up to 100,000 years, based on 1000 simulations.

Values from Postclosure Primary Reference (page 205)

Landscape models

- departure from the critical group assessment
- better suited for population doses
- incorporates landscape processes
  - erosion, deltas, stream re-direction
- visualization ... may be a good public presentation tool

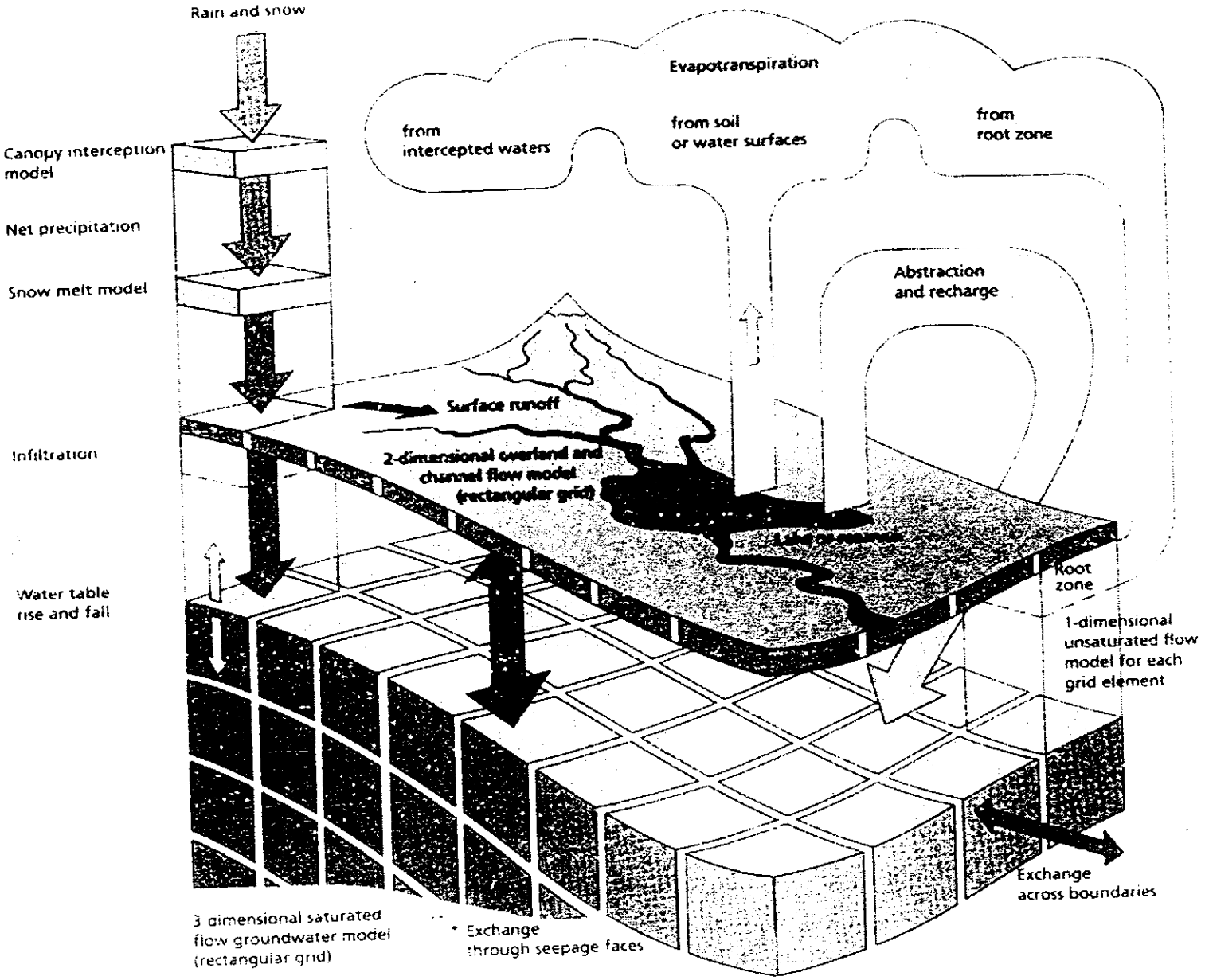


Whiteshell Detailed Model Area

1:100 000 Scale

Kilometres 1 0 1 2 3 4 5 6 7

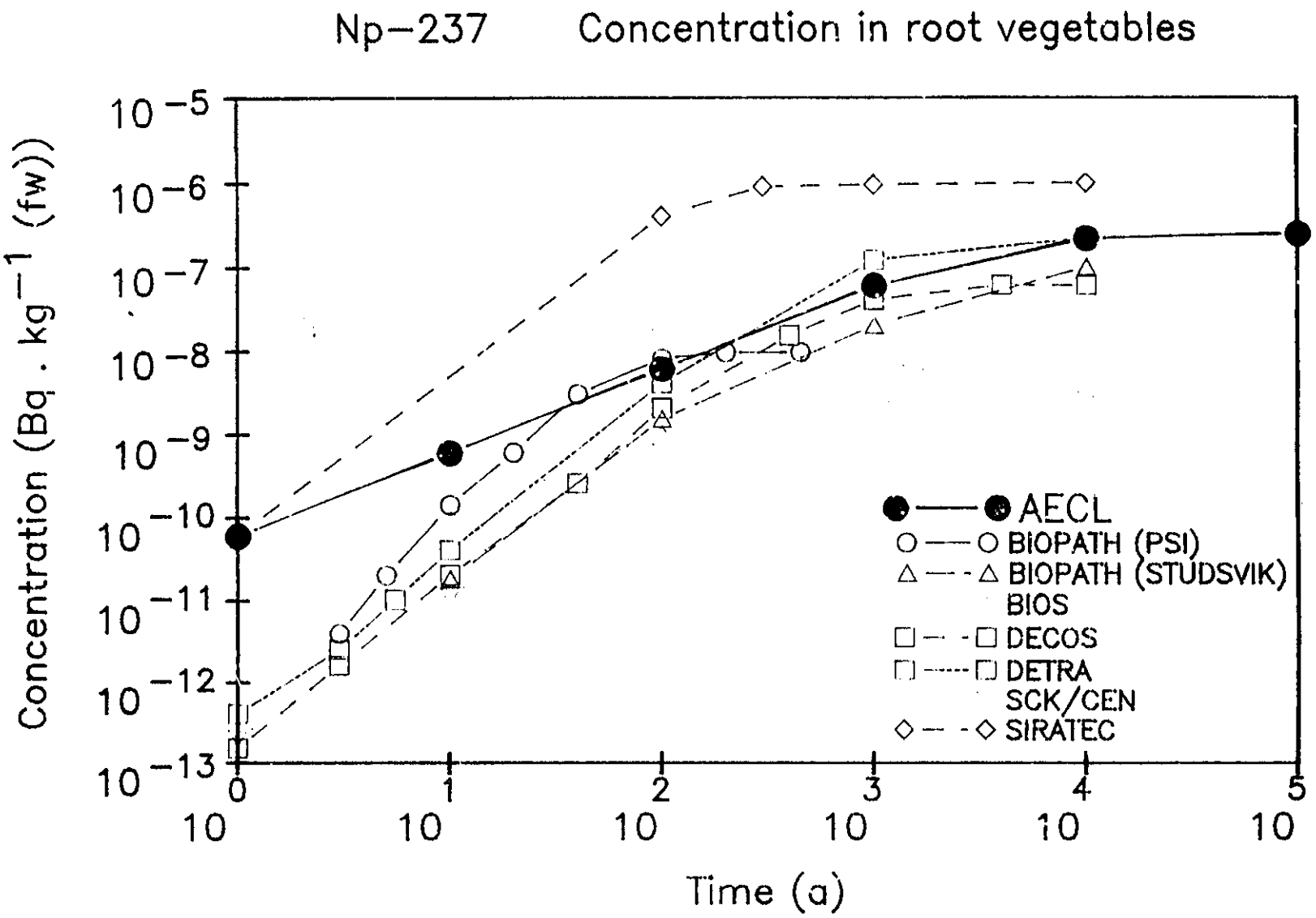
Miles 1 0 1 2 3 4 5

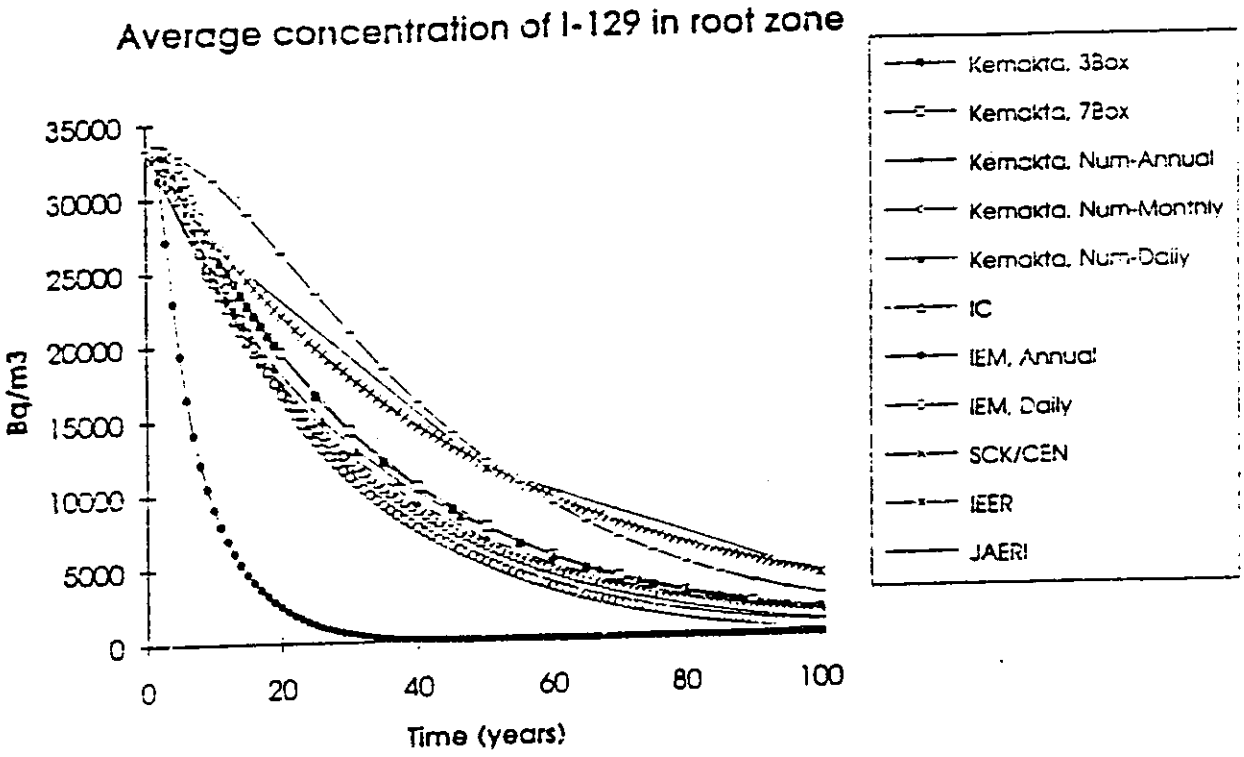

Rain and snow
Evapotranspiration
from intercepted waters
from soil or water surfaces
from root zone
Canopy interception model
Net precipitation
Snow melt model
Abstraction and recharge
Surface runoff
Infiltration
2-dimensional overland and channel flow model (rectangular grid)
Water table rise and fall
Root zone
1-dimensional unsaturated flow model for each grid element
Exchange across boundaries
3 dimensional saturated flow groundwater model (rectangular grid)
Exchange through seepage faces

Kilroy

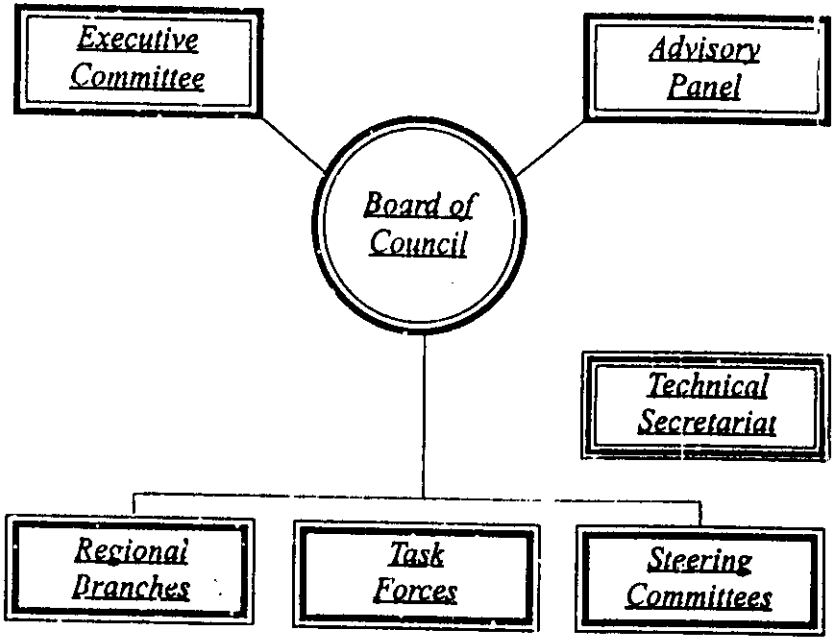
International programs

- BIOMOVS
- VAMP
- BIOMASS


Np–237 Concentration in root vegetables
Concentration (Bq . kg^{-1} (fw))
10^{-5}
10^{-6}
10^{-7}
10^{-8}
10^{-9}
10^{-10}
10^{-11}
10^{-12}
10^{-13}
10^{0}
10^{1}
10^{2}
10^{3}
10^{4}
10^{5}
Time (a)
AECL
BIOPATH (PSI)
BIOPATH (STUDSVIK)
BIOS
DECOS
DETRA
SCK/CEN
SIRATEC


Average concentration of I-129 in root zone
Bq/m3
35000
30000
25000
20000
15000
10000
5000
0
0
20
40
60
80
100
Time (years)
Kemakta, 3Box
Kemakta, 7Box
Kemakta, Num-Annual
Kemakta, Num-Monthly
Kemakta, Num-Daily
IC
IEM, Annual
IEM, Daily
SCK/CEN
IEER
JAERI

IUR Organization



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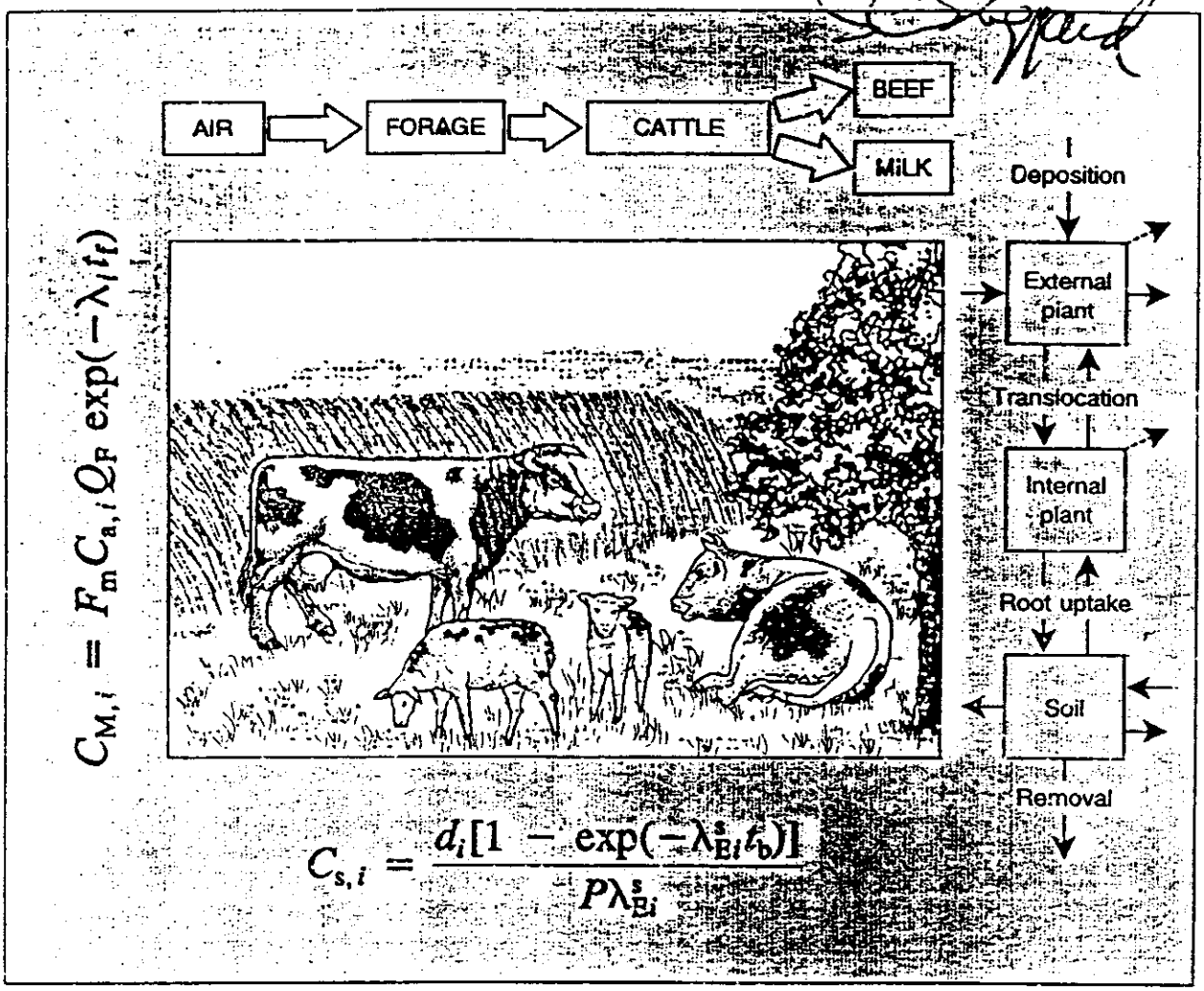
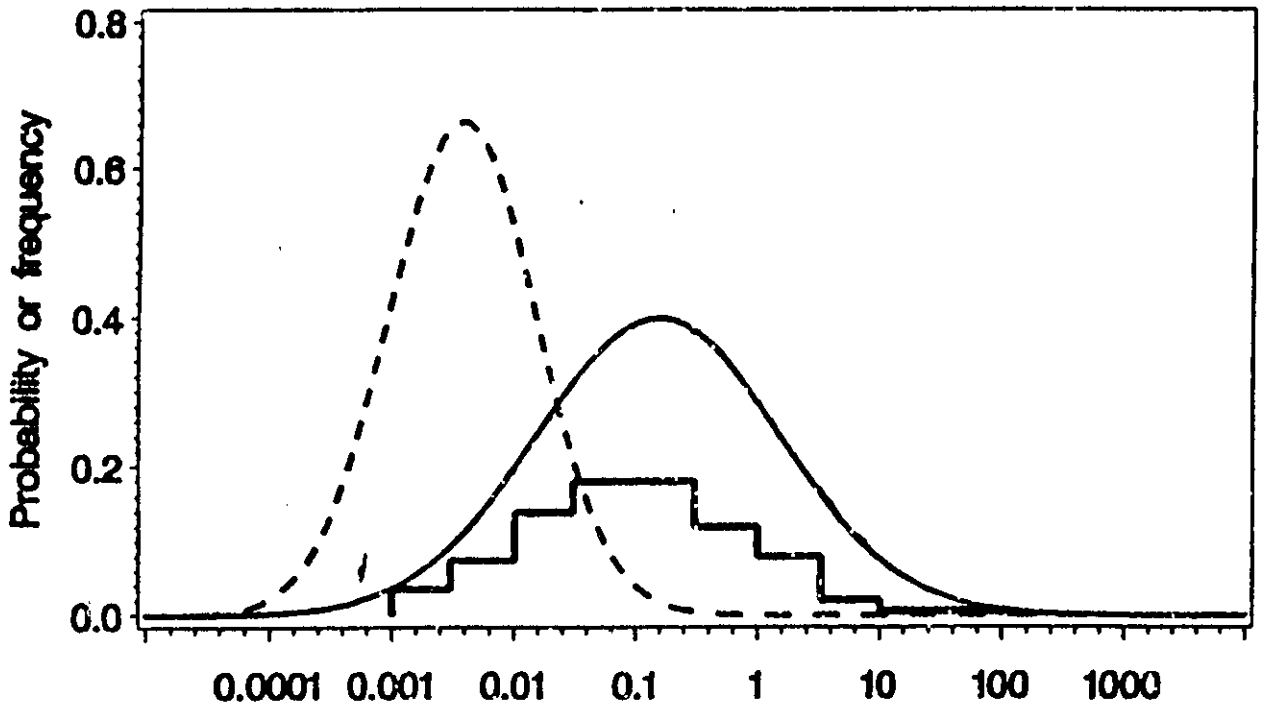


TECHNICAL REPORTS SERIES No. **364**

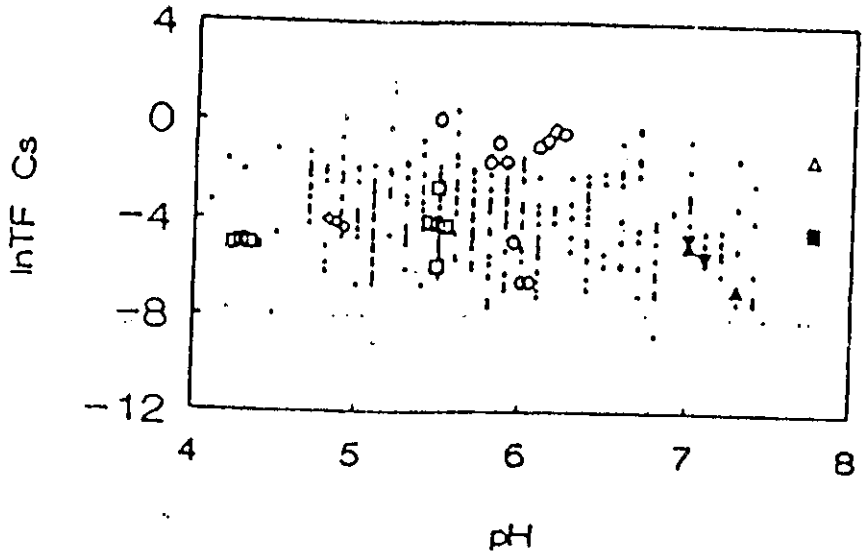
Handbook of Parameter Values for the Prediction of Radionuclide Transfer in Temperate Environments

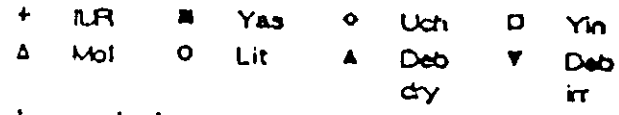
Produced in collaboration with the International Union of Radioecologists

05/08/97 17:11 OAEP 001



Probability distributions of plant/soil concentration ratios (CR) for iodine (I), showing with a solid line the curve used in BIOTRAC, and with a dashed line the distribution of the data of the International Union of Radioecologists. The frequency histograms are of data we found in the literature.





Each symbol represents a single observed TF value.

Large open symbols: Rice

Large closed symbols: Sorghum

Small symbols: Other cereals

Fig 1. TF values of Cs-137for cereals as function of pH.

UIR: Wheat, barley and rye, temperate zones of Europe and S. America.

Yas: T. Yassine, Syria, sorghum.

Uch: S. Uchida, Japan, rice.

Yin: Shu Ying Lai, China, rice.

Mol: A.S. Mollah, Bangladesh, rice.

Lit: Various, probably less reliable, data reported in older literature.

Dep: D.L. Dep, India, irrigated and non-irrigated sorghum.