REFERENCES:


**WEBSITE REFERENCES (2004):**


<http://www.geolsoc.org.uk/template.cfm?name=dust>

<http://www.weedscience.org/in.asp>
APPENDICES

Appendix A: Chromatography (High Performance Thin Layer (HPTLC), Gas Chromatography Mass Spectrometry (GCMS) and High Performance Liquid Chromatography (HPLC)), Kovats Analysis and Fourier Transform Infrared Spectrometry (FTIR).

Appendix B: Size Fractionation of Dried Soils of the Yorke Peninsula.
Appendix A

High performance thin layer chromatography (HPTLC)

Figure A1: High performance thin layer chromatography of glutamic acid (glu), 2,4-dichlorophenoxyacetic acid (2,4-D) and the conjugate of 2,4-D and glu (2,4-D-glu). The dashed line represents the solvent front.
Figure A2: High performance thin layer chromatography of aspartic acid (asp), 2,4-dichlorophenoxyacetic acid (2,4-D) and the conjugate of 2,4-D and asp (2,4-D-asp). The dashed line represents the solvent front.
Figure A3: High performance thin layer chromatography of aspartic acid (asp), glutamic acid (glu) and three soil extracts (S1, S2 and S3). The dashed line represents the solvent front.
**Figure A4 (a):** Mass spectral profile of an analyte obtained from soil extracts that eluted at the solvent front in HPTLC preparations.

**Figure A4 (b):** Isotopic ratio analysis of analytes obtained from soil extracts that eluted at the solvent front in HPTLC preparations (m/z 133, 135 and 137).

**Figure A4:** Isotope ratio analysis of soil extracts.
Figure A4 (b) continued: Isotopic ratio analysis of analytes obtained from soil extracts that eluted at the solvent front in HPTLC preparations (m/z 145, 147, 149 and 161, 163, 165).
Figure A5: Pyrolysis products and mass spectra of the triazine moiety (a) and the non-triazine moiety (b) of chlorsulfuron (a sulfonylurea herbicide).
Figure A6: The mass spectra of 9,Octadecenoic acid methyl ester (a) and Oleoyl alcohol (b)
Figure A7: GCMS analysis of twelve aliphatic esters of 2,4-D.
2,4-D methyl ester

2,4-D ethyl ester

2,4-D propyl ester

Figure A7: (continued)
Figure A7: (continued).
Average of 11.861 to 11.868 min.: 07GFEB15.D

2,4-D butyl ester

Average of 13.305 to 13.312 min.: 07GFEB17.D

2,4-D hexyl ester

Average of 15.181 to 15.202 min.: 07GFEB19.D

2,4-D octyl ester

Figure A7: (continued).
Figure A7: (continued).
Average of 16.144 to 16.151 min.: 09GFEB21.D

(2,4-D) cis-3-nonenyl ester

Average of 18.687 to 18.701 min.: 07GFEB25.D

(2,4-D) 10-undecenyl ester

Average of 18.675 to 18.696 min.: 07GFEB27.D

(2,4-D) undecanyl

Figure A7: (continued).
Figure A7: (continued).
Figure A7: (continued).
Figure A8: Isotope ratio analysis of the nonenyl ester of 2,4-D prepared by the method of Sanchez et al. (1991).
Figure A8: (continued).
Figure A9: Isotope ratio analysis of whole soil #91
Figure A9: (continued).
Figure A10: GCMS analysis of dust (fraction 5) obtained from soil #47

Note: m/z = 220 was not detected. A high quality control (HQC) mixture of herbicides and a dust ‘blank’, containing no herbicide, also showed no response other than for the internal standard emphasizing the specificity of the methodology for 2,4-D and 2,4-D like compounds.
Eight fatty acid methyl esters were analysed: tetradecanoic acid methyl ester (14:0); pentadecanoic acid methyl ester (15:0); hexadecanoic acid methyl ester (16:0); 9,12 octadecadienoic acid methyl ester (18:2); 9 octadecenoic acid methyl ester (18:1); octadecanoic acid methyl ester (18:0); 11-eicosenoic acid methyl ester (20:1); eicosanoic acid methyl ester (20:0).

Twelve aliphatic esters of 2,4-D were analysed: 2,4-D methyl ester; 2,4-D ethyl ester; 2,4-D propyl ester; 2,4-D butyl ester; 2,4-D hexyl ester; 2,4-D octyl ester; (2,4-D) cis-3-nonenyl ester; (2,4-D) 10-undecenyl ester; (2,4-D) undecanyl; (2,4-D) dodecanyl; (2,4-D) hexadecanyl and (2,4-D) oleoyl ester.

Figure A11: Kovats analysis of retention time data.
Kovats analysis of 2,4-D like chemicals

\[ y = 0.005x + 1.3613 \]

\[ R^2 = 0.95 \]

Figure A11: (continued).
(a) Scan of an extract of whole soil #58 (no treatment) showing an acid-labile analyte (arrow).

(b) Scan of an extract of whole soil #58 (extracted ion m/z =145) after an acid hydrolysis treatment

**Figure A12:** Scans of acid and alkali treatments of soil extracts.
(c) Scan of an extract of whole soil #58 (extracted ion m/z =145) after sequential treatments with acid then alkali.

**Figure A12 (continued):** Scans of acid and alkali treatments of soil extracts.
Figure A13: FTIR of isolated 2,4-dichlorophenoxyacetic acid

Figure A14: FTIR of an amino acid conjugate (2,4-D-asp) of 2,4-D.
Figure A14 (continued): FTIR of an amino acid conjugate (2,4-D-glu) of 2,4-D.
Figure A15: (a) The oleoyl ester of 2,4-dichlorophenoxyacetic acid

Figure A15: (b) Soil extract

**Figure A15**: FTIR of the oleoyl ester of 2,4-dichlorophenoxyacetic acid and a soil extract.
Figure A16: Sulfonylurea analysis of whole soils by HPLC
Appendix B

SIZE FRACTIONATION OF DRIED SOILS OF THE YORKE PENINSULA.
Figure B1: Size fractionation of dried soils of the Yorke Peninsula.
Figure B1 (continued): Size fractionation of dried soils of the Yorke Peninsula.
Figure B1 (continued): Size fractionation of dried soils of the Yorke Peninsula.
## Table 1: Size fractionation of dried soils of the Yorke Peninsula.

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**Table 1 (continued):** Size fractionation of dried soils of the Yorke Peninsula.