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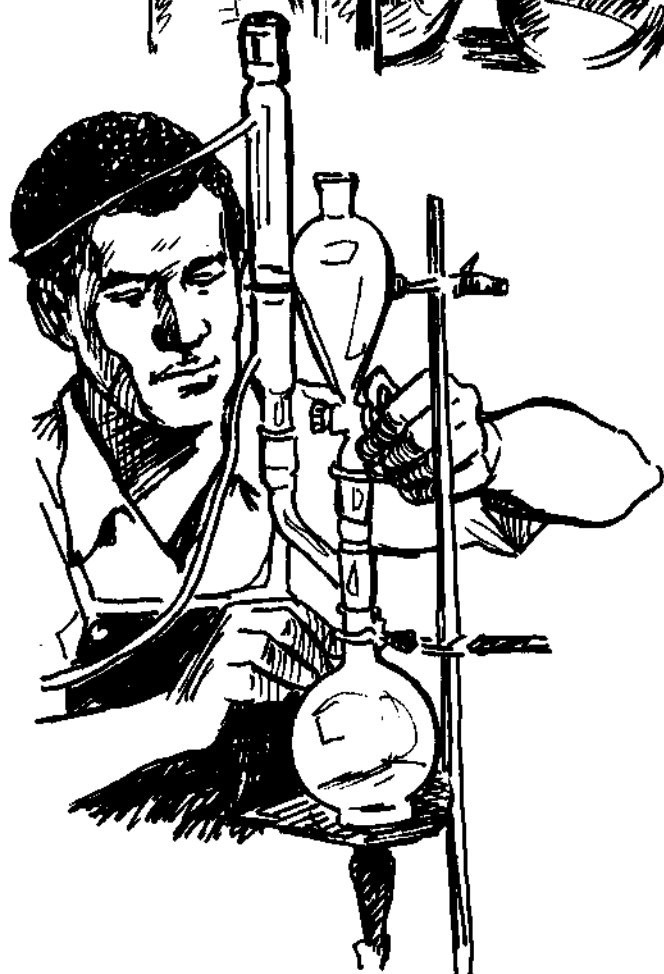
38

Description Notes



Selected Bibliography of the Phenoxy Herbicides

VI. Methods of Extraction and Analysis



The Texas Agricultural Experiment Station, Neville P. Clarke, Director,
The Texas A&M University System, College Station, Texas

In cooperation with Federal Research—Science
and Education Administration, U.S. Department of Agriculture

CONTENTS

Introduction.....	1
List of Abbreviated Sources.....	2
Language Abbreviation.....	6
Subject Index.....	7
Bibliography.....	13
Keywords.....	34
Acknowledgment.....	Inside Back Cover

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SELECTED BIBLIOGRAPHY OF THE
PHENOXY HERBICIDES

VI. Methods of Extraction and Analysis

R. W. Bovey and J. D. Diaz-Colon*

Introduction

Five previous phenoxy herbicide bibliographies regarding fate, dioxin, toxicology, ecology, and microorganisms were published in 1976, 1977, and 1978.

Acceptable extraction and analytical procedures are required to monitor accurately the phenoxy herbicide residues in animals, plants and the environment. This publication provides a list of the older, as well as the latest techniques available.

References are listed in alphabetical order according to senior author's name. A subject numerical index is provided. Each number identifies a reference in the author's alphabetical list. For references published in languages other than English, the abbreviated form of the particular language is enclosed in parentheses after the title. A list of the abbreviated and complete names of languages and a list of the abbreviated and complete names of periodicals, together with their countries and cities of origin, is also provided. If English abstracts for the references are available, the abstract sources are included after the listed reference.

*Respectively, research agronomist and agricultural research technician, Federal Research, Science and Education Administration, U.S. Department of Agriculture, and The Texas Agricultural Experiment Station (Department of Range Science).

List of Abbreviated Sources

Acta Chem. Scand.	Acta Chemica Scandinavica (Copenhagen, Denmark)
Acta Vet. Scand.	Acta Veterinaria Scandinavica (Copenhagen, Denmark)
Advan. Chem. Ser.	Advances in Chemistry Series (Washington, D.C.)
Advan. Pest Control Res.	Advances in Pest Control Research (New York, N.Y.)
Agrochimica	Agrochimica (Pisa, Italy)
Agron. J.	Agronomy Journal (Madison, Wisc.)
Am. Chem. Soc., Abstr. Pap., Nat. Meet., Pestic. Chem. Sec.	American Chemical Society, Abstracts of Papers of the National Meetings, Pesticides Chemistry Section (Washington, D.C.)
Anal. Biochem.	Analytical Biochemistry (Baltimore, Md.)
Anal. Chem.	Analytical Chemistry (Washington, D.C.)
Anal. Methods Pestic. Plant Growth Regul.	Analytical Methods for Pesticides and Plant Growth Regulators (New York, N.Y.)
Analyst	Analyst (London, England)
An. Quim.	Anales de Quimica (Madrid, Spain)
Ann. Chim.	Annali di Chimica (Rome, Italy)
Ann. Falsif. Expert. Chim.	Annales des Falsifications et de l'Expertise Chimique (Paris, France)
Arch. Environ. Contam. Toxicol.	Archives of Environmental Contamina- tion and Toxicology (New York, N.Y.)
Arch. Vet. Ital.	Archivio Veterinario Italiano (Milan, Italy)
Arm. Khim. Zh.	Armyanskii Khimicheskii Zhurnal (Yerevan, USSR)
Biol. Plant	Biologia Plantarum (Prague, Czechoslovakia)
Bot. Gaz.	Botanical Gazette (Chicago, Ill.)
Bull. Environ. Contam. Toxicol.	Bulletin of Environmental Contamina- tion and Toxicology (New York, N.Y.)
Can. J. Soil Sci.	Canadian Journal of Soil Science (Ottawa, Canada)

Cesk. Hyg.	Ceskoslovenska Hygiene (Prague, Czechoslovakia)
Chem. Abstr.	Chemical Abstracts (Columbus, Ohio)
Chem. Anal.	Chemia Analityczna (Warsaw, Poland)
Chem. Rundsch.	Chemische Rundschau (Solothurn, Switzerland)
Chim. Anal.	Chimie Analytique (Malmaison, France)
Chromatographia	Chromatographia (Brunswick, Germany)
Contrib. Boyce Thompson Inst.	Contributions from Boyce Thompson Institute (Yonkers, New York, N.Y.)
Down Earth	Down to Earth (Midland, Mich.)
Dtsch. Lebensm.-Rundsch.	Deutsche Lebensmittel-Rundschau (Stuttgart, Germany)
Eisei Kagaku	Eisei Kagaku (Tokyo, Japan)
Environ. Sci. Technol.	Environmental Science and Technology (Washington, D.C.)
Farm. Zh. (Kiev)	Farmatsevtichnii Zhurnal (Kiev, USSR)
Fresenius Z. Anal. Chem.	Fresenius Zeitschrift fuer Analytische Chemie (Berlin, Germany)
Gig. Sanit.	Gigiena i Sanitariya (Moscow, USSR)
Gig. Tr. Prof. Zabol.	Gigiena Truda i Professional'nye Zabolevaniya (Moscow, USSR)
Health Aspects Pestic.	Health Aspects of Pesticides, Abstract Bulletin (Chamblee, Ga.)
Hilgardia	Hilgardia (Berkeley, Calif.)
Igiena	Igiena (Bucharest, Rumania)
Int. J. Environ. Anal. Chem.	International Journal of Environmental Analytical Chemistry (London, England)
Int. Sugar J.	International Sugar Journal (High Wycombe, England)

J. Agric. Food Chem.	Journal of Agriculture and Food Chemistry (Washington, D.C.)
J. Air Pollut. Control Assoc.	Journal of the Air Pollution Control Association (Pittsburgh, Pa.)
J. Am. Water Works Assoc.	Journal of the American Water Works Association (New York, N.Y.)
J. Assoc. Off. Agric. Chem.	Journal of the Association of Official Agricultural Chemists (Washington, D.C.)
J. Assoc. Off. Anal. Chem.	Journal of the Association of Official Analytical Chemists (Washington, D.C.)
J. Chromatogr.	Journal of Chromatography (Amsterdam, Netherlands)
J. Chromatogr. Sci.	Journal of Chromatographic Science (Niles, Ill.)
J. Environ. Sci. Health, Part B	Journal of Environmental Science and Health. Part B. Pesticides, Food Contaminant and Agricultural Wastes (New York, N.Y.)
J. Fish. Res. Board Can.	Journal of the Fisheries Research Board of Canada (Ottawa, Ontario, Canada)
J. Sci. Food Agric.	Journal of the Science of Food and Agriculture (London, England)
Kerteszetiegy. Kozl.	Kerteszetiegyetem Kozlemenyei (Budapest, Hungary)
Khim. Sel'sk. Khoz.	Khimiya v Selsom Khoziastive (Moscow, USSR)
Meded. Fac. Landbouwwet., Rijksuniv. Gent	Mededelingen van de Faculteit Landbouwwetenschappen, Rijksuniversiteit Gent (Ghent, Belgium)
Mikrochim. Acta	Mikrochimica Acta (Vienna, Austria)
Nachrichtenbl. Dtsch. Pflanzenschutzdienstes (Braunschweig)	Nachrichtenblatt des Deutschen Pflanzenschutzdienstes (Braunschweig) (Stuttgart, Germany)
Nahrung	Nahrung (Berlin, Germany)
Nippon Dojo Hiriyogaku Zasshi	Nippon Dojo Hiriyogaku Zasshi (Tokyo, Japan)
Noyaku Kagaku	Noyaku Kagaku (Tokyo, Japan)
Noyaku Kensasho Hokoku	Noyaku Kensasho Hokoku (Tokyo, Japan)

Period. Polytech., Chem. Eng.	Periodica Polytechnica, Chemical Engineering (Budapest, Hungary)
Pestic. Abstr.	Pesticides Abstracts (Washington, D.C.)
Pestic. Monit. J.	Pesticides Monitoring Journal (Atlanta, Ga.)
Pestic. Sci.	Pesticide Science (London, England)
Phytiatr. Phytopharm.	Phytiatrie-Phytopharmacie (Versailles, France)
Phytochemistry	Phytochemistry (New York, N.Y.)
Plant Physiol.	Plant Physiology (Kutztown, Pa.)
Plant Soil	Plant and Soil (The Hague, Netherlands)
Pollut. Abstr.	Pollution Abstracts (Louisville, Ky.)
Probl. Anal. Khim.	Problemy Analiticheskoi Khimii (Moscow, USSR)
Proc. Am. Soc. Hortic. Sci.	Proceedings of the American Society for Horticultural Science (St. Joseph, Mich.)
Proc. Am. Water Works Assoc.	Proceedings of American Water Works Association (New York, N.Y.)
Proc. Nat. Acad. Sci. U.S.A.	Proceedings of the National Academy of Sciences of the United States of America (Washington, D.C.)
Proc. Soil Sci. Soc. Am.	Proceedings of the Soil Science Society of America (Madison, Wis.)
Proc. South. Weed Conf.	Proceedings of the Southern Weed Conference (St. Louis, Mo.)
Proc. West. Soc. Weed Sci.	Proceedings of the Western Society of Weed Science (Logan, Utah)
Residue Rev.	Residue Reviews (New York, N.Y.)
Riso	Riso (Milan, Italy)
Rocz. Panstw. Zakl. Hig.	Roczniki Panstwowego Zakladu Higieny (Warsaw, Poland)
Science	Science (Washington, D.C.)
Soil Crop Sci. Soc. Fla., Proc.	Soil and Crop Science Society of Florida, Proceedings (Gainesville, Fla.)

Sud. Med. Ekspert.	Sudebno-Meditsinskaya Ekspertiza (Moscow, USSR)
U.S. Fish Wildl. Serv., Cir.	U.S. Fish and Wildlife Service, Cir- cular (Washington, D.C.)
Vopr. Pitan.	Voprosy Pitaniya (Moscow, USSR)
Water Res.	Water Research (Oxford, England)
Weed Abstr.	Weed Abstracts (Oxford, England)
Weed Res.	Weed Research (Oxford, England)
Weed Sci.	Weed Science (Champaign, Ill.)
Weeds	Weeds (Champaign, Ill.)
Z. Chem.	Zeitschrift fuer Chemie (Leipzig, E. Germany)
Zentralbl. Bakteriol., Para- sitenk., Infektionskr. Hyg., Abt. 1: Orig., Reihe B	Zentralblatt fuer Bakteriologie, Parasitenkunde, Infektionskrank- heiten und Hygiene, Abteilung 1: Originale, Reihe B (Stuttgart, Germany)
Zh. Anal. Khim.	Zhurnal Analiticheskoi Khimii (Moscow, USSR)

Language Abbreviation

Cs - Czech	It - Italian
De - German	Ja - Japanese
Es - Spanish	Pl - Polish
Fr - French	Ro - Romanian
Hu - Hungarian	Ru - Russian

Subject Index

I. 2,4-D (2,4-dichlorophenoxy)acetic acid

A. Analysis

1. Chromatography

a. Gas - 2, 5, 7, 9, 10, 11, 17, 18, 19, 20, 21, 22, 23, 28, 29, 31, 32, 34, 35, 38, 40, 41, 42, 44, 46, 47, 52, 54, 55, 58, 62, 63, 67, 70, 72, 76, 77, 79, 80, 86, 87, 90, 94, 95, 97, 98, 103, 104, 110, 111, 112, 113, 115, 116, 117, 118, 119, 121, 122, 124, 127, 131, 133, 137, 140, 141, 145, 152, 153, 158, 159, 168, 169, 170, 171, 172, 173, 174, 177, 178, 182, 183, 184, 185, 193, 194, 200, 206, 207, 208, 211, 213, 216, 217, 218, 225, 226, 228, 229, 231, 232, 233, 234, 235, 236, 237, 240, 242

b. Thin-layer - 1, 8, 13, 24, 25, 26, 27, 34, 53, 60, 64, 73, 88, 99, 100, 101, 116, 142, 143, 149, 165, 187, 192, 200, 203, 204, 205, 206, 226, 238, 239

c. Paper - 1, 59, 64, 147, 215, 221, 225, 232

2. Spectrophotometry - 6, 15, 16, 31, 41, 49, 57, 68, 69, 71, 75, 82, 83, 84, 89, 114, 116, 125, 132, 134, 135, 136, 137, 146, 150, 158, 161, 190, 191, 212, 221, 222, 224, 225, 227

3. Spectrometry

a. Mass - 22, 62, 63, 64, 172, 181, 217, 218

b. Laser Raman - 176

c. Nuclear Magnetic Resonance - 179

4. Polarography - 65, 189

5. Electrophoresis - 167

6. Ion Selective Electrode - 102

7. Isotope - 37, 89, 128, 172, 182, 186

8. Titration - 78, 96, 107, 108

9. Combustion - 33, 164

10. Bioassay - 4, 55, 61, 74, 81, 85, 105, 106, 109, 111, 120, 123, 126, 151, 154, 155, 157, 160, 163, 175, 180, 198, 199

- B. Extraction - 45, 66, 104, 124, 140, 156, 190, 193, 195, 196, 197
- II. 2,4-DB [4-(2,4-dichlorophenoxy)butyric acid]
 - A. Analysis
 - 1. Chromatography
 - a. Gas - 31, 34, 42, 44, 46, 72, 90, 94, 95, 118, 121, 122, 131, 169, 206, 217, 219, 220, 226, 232, 233, 235, 236
 - b. Thin-layer - 1, 34, 73, 88, 149, 192, 203, 206, 226
 - c. Paper - 1, 232
 - 2. Spectrophotometry - 31
 - 3. Spectrometry
 - a. Mass - 217
 - 4. Electrophoresis - 167
 - 5. Combustion - 164
 - 6. Bioassay - 106, 110, 120, 157
 - B. Extraction - 45, 197
- III. 2,4-DP (dichlorprop) [2-(2,4-dichlorophenoxy)propionic acid]
 - A. Analysis
 - 1. Chromatography
 - a. Gas - 44, 127, 145, 206, 217
 - b. Thin-layer - 25, 27, 53, 73, 192, 203, 204, 205, 206, 238
 - 2. Spectrometry
 - a. Mass - 217
 - 3. Electrophoresis - 167
 - 4. Bioassay - 106
 - B. Extraction - 45
- IV. MCPA [(4-chloro-*o*-tolyl)oxy]acetic acid, (2-methyl-4-chlorophenoxy-acetic acid)
 - A. Analysis

1. Chromatography
 - a. Gas - 3, 14, 23, 34, 42, 46, 49, 72, 92, 93, 98, 118, 145, 158, 159, 178, 201, 206, 217, 232, 233, 235, 236
 - b. Thin-layer - 1, 24, 25, 26, 27, 34, 36, 53, 60, 73, 142, 143, 192, 201, 205, 206, 214, 223, 238, 239
 - c. Paper - 1, 59, 223, 232
2. Spectrophotometry - 83, 132, 158, 209, 223
3. Spectrometry
 - a. Mass - 181, 217
4. Polarography - 189
5. Electrophoresis - 167, 223
6. Isotope - 37
7. Bioassay - 4, 106, 129, 130, 155, 157, 188
- B. Extraction - 66, 197
- V. MCPB {4-[(4-chloro-*o*-tolyl)oxy]butyric acid, (4-(2-methyl-4-chloro-phenoxy)butyric acid)}
- A. Analysis
 1. Chromatography
 - a. Gas - 3, 14, 118, 201, 206, 217
 - b. Thin-layer - 1, 25, 53, 73, 192, 201, 204, 205, 206
 - c. Paper - 1
 2. Spectrometry
 - a. Mass - 217
 3. Bioassay - 157
- B. Extraction - 197
- VI. MCPP (mecoprop) {2-(4-chloro-2-methylphenoxy)propionic acid, 2-[(4-chloro-*o*-tolyl)oxy]propionic acid}
- A. Analysis
 1. Chromatography

- a. Gas - 31, 32, 46, 72, 119, 145, 178, 206, 217, 242
 - b. Thin-layer - 27, 73, 88, 192, 204, 205, 206, 238
 - 2. Spectrophotometry - 6, 31
 - 3. Spectrometry
 - a. Mass - 217
 - 4. Bioassay - 106, 157
- VII. 2,4,5-T (2,4,5-trichlorophenoxy)acetic acid
- A. Analysis
 - 1. Chromatography
 - a. Gas - 11, 17, 21, 22, 23, 28, 29, 31, 32, 34, 39, 40, 42, 46, 56, 67, 72, 79, 98, 110, 112, 115, 116, 118, 121, 122, 124, 138, 139, 144, 145, 148, 152, 153, 168, 169, 170, 171, 183, 184, 185, 194, 206, 207, 208, 213, 216, 217, 226, 229, 232, 233, 235, 236, 240
 - b. Thin-layer - 1, 34, 36, 53, 60, 73, 116, 142, 143, 149, 192, 206, 226
 - c. Paper - 1, 59, 147, 225, 232
 - 2. Spectrophotometry - 6, 16, 31, 49, 68, 82, 83, 84, 116, 146, 150, 161
 - 3. Spectrometry
 - a. Mass - 22, 50, 51, 217
 - 4. Polarography - 189
 - 5. Electrophoresis - 167
 - 6. Isotope - 56, 148
 - 7. Titration - 96, 108, 109
 - 8. Combustion - 164
 - 9. Bioassay - 4, 81, 105, 106, 138, 157, 198
 - B. Extraction - 66, 124, 156, 197
- VIII. 2,4,5-TB [4-(2,4,5-trichlorophenoxy)butyric acid]
- A. Analysis

1. Chromatography
 - a. Gas - 206, 217
 - b. Thin-layer - 73, 206
 2. Spectrometry
 - a. Mass - 217
 3. Combustion - 164
- IX. Erbon [2-(2,4,5-trichlorophenoxy)ethyl-2,2-dichloropropionate]
- A. Analysis
 1. Chromatography
 - a. Gas - 230
- X. Sesone [sodium 2-(2,4,5-trichlorophenoxy)ethyl sulfate]
- A. Analysis
 1. Combustion - 164
- XI. Silvex [2-(2,4,5-trichlorophenoxy)propionic acid]
- A. Analysis
 1. Chromatography
 - a. Gas - 23, 30, 31, 32, 40, 42, 43, 46, 72, 73, 79, 91, 103, 110, 118, 121, 122, 141, 145, 162, 166, 169, 206, 216, 217, 232, 233, 235, 236, 241, 242
 - b. Thin-layer - 206
 - c. Paper - 232
 2. Spectrophotometry - 31, 136, 137, 161
 3. Spectrometry
 - a. Mass - 217
 4. Electrophoresis - 167
 5. Combustion - 164
 6. Bioassay - 106

XII. 4-CPA (4-chlorophenoxy)acetic acid

A. Analysis

1. Chromatography

a. Gas - 12, 48, 49, 194

2. Bioassay - 151

B. Extraction - 197

XIII. Phenoxy herbicides (general)

A. Analysis

1. Chromatography

a. Thin-layer - 202

2. Polarography - 210

A
—

1. Abbott, D. C., H. Egan, E. W. Hammond, and J. Thomson. 1964. The chromatographic detection and determination of organo-chlorine herbicides in soil and water. *Analyst* 89(1060):480-488.
2. Adams, D. F., C. M. Jackson, and W. L. Bamesberger. 1964. Quantitative studies of 2,4-D esters in the air. *Weeds* 12(4):280-283.
3. Agemian, H. and A. S. Y. Chau. 1976. Determination of pesticides by derivative formation. Part IV. A sensitive gas-chromatographic method for the determination of MCPA and MCPB herbicides after esterification with 1-bromomethyl-2,3,4,5,6-pentafluorobenzene. *Analyst* 101(1206):732-737. *Weed Abstr.* 26(2):301, 1977.
4. Allard, R. W., H. R. DeRose, and C. P. Swanson. 1946. Some effects of plant growth-regulators on seed germination and seedling development. *Bot. Gaz.* 107:575-583.
5. Allebone, J. E. and R. J. Hamilton. 1975. Determination of 2,4-D in plant tissue. I. *J. Chromatogr.* 108(1):188-193. *Pestic. Abstr.* 8(8):555-556, 1975.
6. Aly, O. M., S. D. Faust, and I. H. Suffet. 1971. Ultraviolet spectrophotometry in residue analysis; spectra-structure correlations. *Advan. Chem. Ser.* 104:95-118. *Weed Abstr.* 22(5):96, 1973.
7. Anonymous. 1968. 2,4-D in milk and other animal products. P 79. In *Chemistry and Toxicology of Agricultural Chemicals - a four year summary report, 1965 through 1968.* Food Protection and Toxicology Center, University of California; Davis, Calif.
8. Anonymous. 1974. Recent analytical and process findings in water chemistry. (De.) *Chem. Rundsch.* 26(40):5. *Pestic. Abstr.* 7(5):325-326, 1974.
9. Arjmand, M. and R. O. Mumma. 1976. Metabolism of 2,4-dichlorophenoxyacetic acid. 8. Gas-liquid chromatography of trimethylsilyl derivatives of amino acid conjugates. *J. Agric. Food Chem.* 24(3):574-580.
10. Arjmand, M. and R. O. Mumma. 1976. Metabolism of 2,4-dichlorophenoxyacetic acid. IX. Gas-liquid chromatography of methyl esters of amino acid conjugates. *J. Chromatogr.* 124(1):97-104. *Pestic. Abstr.* 9(11):815, 1976.
11. Arnold, E. L. and A. L. Young. 1976. A rapid gas chromatographic method for the determination of several phenoxyalkanoic acid herbicides in soil samples. FJSRL(NC)-RM-76-5. Department of Chemistry and Biological Sciences. U.S. Air Force Academy, Colo. 80840. 12 p.
12. Asmundson, C. M., J. M. Lyons, and F. H. Takatori. 1966. Residue analysis of 4-chlorophenoxyacetic acid in tomato fruit. *J. Agric. Food Chem.* 14(6):627-630.

13. Aturyan, M. M., G. T. Katvalyan, and V. V. Dovlatyan. 1971. Thin-layer-chromatographic investigation of herbicides. Identification and analysis of Crotilin and 2,4-D acid and its sodium salt. (Ru.) *Arm. Khim. Zh.* 24(12):1085. *Health Aspects Pestic.* 5(12):628, 1972. *Weed Abstr.* 23(1):20, 1974.

B

14. Bache, C. A., D. J. Lisk, and M. A. Loos. 1964. Electron affinity residue determination of nitrated MCP, MCPB, and NAA; conversion of MCPB to MCP in bean plants. *J. Assoc. Off. Agric. Chem.* 47(2):348-352.
15. Bandurski, R. S. 1947. Spectrophotometric method for determination of 2,4-dichlorophenoxyacetic acid. *Bot. Gaz.* 108:446-449.
16. Barrette, J. P. and R. Payfer. 1962. Determination of 2,4-D and 2,4,5-T as simple constituents and as mixed constituents in commercial ester formulations. *J. Assoc. Off. Anal. Chem.* 45(3):517-522.
17. Baur, J. R., R. D. Baker, and F. S. Davis. 1971. Reaction conditions necessary for silylation of herbicides. *J. Assoc. Off. Anal. Chem.* 54(3):713-717. *Weed Abstr.* 21(3):245, 1972.
18. Begliomini, A. and A. Fravolini. 1971. Insecticide residues in animal feeds. Note II. Identification and determination of organochlorine and organophosphate insecticides in feeds by gas chromatography. (It.) *Arch. Vet. Ital.* 22(2/3):109-118. *Health Aspects Pestic.* 5:108, 1972.
19. Bevenue, A., G. Zweig, and N. L. Nash. 1962. Residue determination of 2,4-dichlorophenoxyacetic acid in dry crops and walnuts. *J. Assoc. Off. Anal. Chem.* 45(4):990-993.
20. Bevenue, A., G. Zweig, and N. L. Nash. 1963. Cleanup for residue analysis of some 2,4-D esters in potatoes. *J. Assoc. Off. Anal. Chem.* 46(5):881-883.
21. Bevenue, A. 1967. Gas chromatography. Applications and limitations in pesticide residue analysis. *Anal. Methods Pestic. Plant Growth Regul.* 5:3-45.
22. Biros, F. J. 1971. Applications of combined gas chromatography-mass spectrometry to pesticide residue identifications. *Advan. Chem. Ser.* 104:132-150. *Weed Abstr.* 22(6):126, 1973.
23. Bjerke, E. L., J. L. Herman, P. W. Miller, and J. H. Wetters. 1972. Residue study of phenoxy herbicides in milk and cream. *J. Agric. Food Chem.* 20(5):963-967. *Health Aspects Pestic.* 6(1):10, 1973. *Weed Abstr.* 22(6):127, 1973.

24. Bogacka, T. and R. Taylor. 1970. Determination of 2,4-D and MCPA herbicides in water by thin-layer chromatography. (Pl.) Chem. Anal. 15(1):143-150. Weed Abstr. 21(5):412, 1972.
25. Bogacka, T. 1971. Application 4-aminoantipyrine to colorimetric determination of chlorophenoxyalkyl acid derivatives. (Pl.) Chem. Anal. 16(1):59-64. Health Aspects Pestic. 5:192, 1972.
26. Bogacka, T. and R. Taylor. 1971. Determination of the herbicides 2,4-DP and MCPP in water by thin-layer chromatography. (Pl.) Chem. Anal. 16(1):215-218. Health Aspects Pestic. 5:192, 1971. Weed Abstr. 21(5):412, 1972.
27. Bogacka, T. 1975. Colorimetric determination in water of pesticidal aryloxyalkenecarboxylic acid derivatives. (Pl.) Chem. Anal. 20(2):401-403. Pestic. Abstr. 10(2):98, 1977.
28. Bradley, J. K. and W. K. Thompson. 1964. Determination of 2,4-dichlorophenoxyacetic acid and 2,4,5-trichlorophenoxyacetic acid in lawn fertilizers. J. Sci. Food Agric. 15:673-677.
29. Burke, J. and L. Johnson. 1962. Investigations in the use of the micro-coulometric gas chromatograph for pesticide residue analysis. J. Assoc. Off. Anal. Chem. 45(2):348-354.

C
—

30. Carello, M. and L. Vietti. 1975. Research and determination of herbicide residues of 2(2,4,5-T)P in rice. (It.) Riso 24(3):231-237.
31. Caswell, R. L. 1974. Report on pesticide formulations. J. Assoc. Off. Anal. Chem. 57(2):249-251. Pestic. Abstr. 8(2):112, 1975.
32. Caswell, R. L. 1976. Report on pesticide formulations. I. J. Assoc. Off. Anal. Chem. 59(2):296-297. Pestic. Abstr. 9(10):747, 1976.
33. Cheng, H. H. and F. O. Farrow. 1976. Determination of ¹⁴C-labeled pesticides in soils by a dry combustion technique. Proc. Soil Sci. Soc. Am. 40(1):148-150. Pestic. Abstr. 9(5):362, 1976.
34. Chmil, V. D. 1976. Chromatographic determination of residues of herbicides which are phenoxyalkanoic acid derivatives (2,4-D, MCPA, and 2,4-DB) in water. (Ru.) Gig. Sanit. 41(4):66-69. Pestic. Abstr. 9(11):811, 1976.
35. Choi, K. L., S. S. Que Hee, and R. G. Sutherland. 1976. 2,4-D levels in the south Saskatchewan River in 1973 as determined by a GLC method. J. Environ. Sci. Health, Part B. 11(2):175-183.
36. Chow, C., M. L. Montgomery, and T. C. Yu. 1971. Methodology and analysis for residues of MCP and 2,4,5-T in wheat. Bull. Environ. Contam. Toxicol. 6(6):576-580. Weed Abstr. 22(7):152, 1973.

37. Chow, P. N. P. 1974. An improved Toluene/Triton-based liquid scintillation system for counting ^{14}C -labeled compounds at ambient temperature. *Anal. Biochem.* 60(1):322-328. *Pestic. Abstr.* 8(7):488, 1975.
38. Clark, D. E., F. C. Wright, and L. M. Hunt. 1967. Determination of 2,4-D residues in animal tissues. *J. Agric. Food Chem.* 15(1):171-173.
39. Clark, D. E. 1969. Determination of 2,4,5-trichlorophenoxyacetic acid and its propylene glycol butyl ether esters in animal tissue, blood, and urine. *J. Agric. Food Chem.* 17(6):1168-1170.
40. Clark, D. E., J. S. Palmer, R. D. Radeleff, H. R. Crookshank, and F. M. Farr. 1975. Residues of chlorophenoxy acid herbicides and their phenolic metabolites in tissues of sheep and cattle. *J. Agric. Food Chem.* 23(3):573-578. *Pestic. Abstr.* 8(8):536, 1975.
41. Coakley, J. E., J. E. Campbell, and E. F. McFarren. 1964. Determination of butoxyethanol esters of 2,4-dichlorophenoxyacetic acid in shellfish and fish. *J. Agric. Food Chem.* 12(3):262-265.
42. Cochrane, W. P. 1975. Confirmation of insecticide and herbicide residues by chemical derivatization. *J. Chromatogr. Sci.* 13(5):246-253. *Pestic. Abstr.* 8(9):612, 1976.
43. Cochrane, W. P. 1976. Gas liquid chromatographic analysis of ethephon and fenoprop residues in apples and their decline before and after harvest. *J. Assoc. Off. Anal. Chem.* 59(3):617-621. *Pestic. Abstr.* 10(3):147, 1977.
44. Colas, A., A. Lerenard, and J. Royer. 1972. Water pollution. Extraction and determination of certain phenoxyalkanoic herbicides contents. (Fr.) *Chim. Anal.* 54(1):7-21. *Health Aspects Pestic.* 5:309, 1972. *Weed Abstr.* 22(7):152, 1973.
45. Colas, A., A. Lerenard, and J. Royer. 1972. Water pollution. Extraction and determination of certain phenoxyalkanoic herbicides contents. Continuation and conclusion. (Fr.) *Chim. Anal.* 54(2):62-68. *Health Aspects Pestic.* 5:309, 1972.
46. Collier, R. H. and G. S. Grimes. 1974. Determination of chlorophenoxy acids in formulations by gas-liquid chromatography of their trimethylsilyl derivatives. *J. Assoc. Off. Anal. Chem.* 57(4):781-784. *Pestic. Abstr.* 7(11):760, 1974.
47. Crosby, D. G. and J. B. Bowers. 1966. Determination of 2,4-D residues in animal products. *Bull. Environ. Contam. Toxicol.* 1(3):104-107.

D
—

48. Daikyu, Y., H. Uenishi, and I. Hagi. 1974. Method of determining the residues of 4-chloro-phenoxyacetic acid in vegetable crops and soil. (Ja.) *Noyaku Kagaku* 2(2):56-57. *Pestic. Abstr.* 7(12):818, 1974.
49. Dorschner, K. P. and K. P. Buchholtz. 1957. A spectrophotometric method for the determination of several chlorinated phenoxyacetic acids. *Weeds* 5(2):102-107.
50. Dougherty, R. C. and K. Piotrowska. 1976. Multiresidue screening by negative chemical ionization mass spectrometry of organic polychlorides. *J. Assoc. Off. Anal. Chem.* 59(5):1023-1027.
51. Dougherty, R. C. and K. Piotrowska. 1976. Screening by negative chemical ionization mass spectrometry for environmental contamination with toxic residues: Application to human urines. *Proc. Nat. Acad. Sci. U.S.A.* 73(6):1777-1781. *Pestic. Abstr.* 9(10):750, 1976.
52. Duffy, J. R. and P. Shelfoon. 1967. Determination of 2,4-D and its butoxyethanol ester in oysters by gas chromatography. *J. Assoc. Off. Anal. Chem.* 50(5):1098-1102.
53. Dinges, W. 1976. Fluorescence labelling of picomole amounts of acidic herbicides for toxicological analysis. *Chromatographia* 9(12):624-626.
54. Dupuy, A. E., Jr., T. J. Forehand, and H. Tai. 1975. Determination of 2,4-dichlorophenoxyacetic acid in wheat grain. *J. Agric. Food Chem.* 23(4):827-828. *Pestic. Abstr.* 8(10):701, 1976.

E
—

55. Eberle, D. O. and H. R. Gerber. 1976. Comparative studies of instrumental and bioassay methods for the analysis of herbicide residues. *Arch. Environ. Contam. Toxicol.* 4(1):101-118. *Pestic. Abstr.* 9(6):432-433, 1976.
56. Edgerton, L. J. and D. J. Lisk. 1973. Determination of residues of 2,4,5-trichlorophenoxyacetic acid in apples by radioisotope and gas chromatographic methods. *Proc. Am. Soc. Hortic. Sci.* 83:120-125.
57. Erickson, L. C. and B. L. Brannaman. 1954. Chromotropic acid method for determining 2,4-D residues in rinses. *Hilgardia* 23(7):175-184.
58. Erickson, L. C. and H. Z. Hield. 1962. Determination of 2,4-dichlorophenoxyacetic acid in citrus fruit. *J. Agric. Food Chem.* 10(3):204-207.
59. Erne, K. 1963. Detection and determination of chlorophenoxyacetic acid derivatives in water. *Acta Chem. Scand.* 17(6):1663-1676.
60. Erne, K. 1966. Determination of phenoxyacetic herbicide residues in biological materials. *Acta Vet. Scand.* 7:77-96.

61. Eshel, Y. and G. N. Prendeville. 1967. A technique for studying root vs. shoot uptake of soil-applied herbicides. *Weed Res.* 7:242-245.

F
—

62. Farwell, S. O., F. W. Bowes, and D. F. Adams. 1976. Determination of chlorophenoxy herbicides in air by gas chromatography/mass spectrometry: Selective ion monitoring. *Anal. Chem.* 48(2):420-426. *Pestic. Abstr.* 9(4):304, 1976. *Weed Abstr.* 26(1):31, 1977.
63. Farwell, S. O., E. Robinson, W. J. Powell, and D. F. Adams. 1976. Survey of airborne 2,4-D in south-central Washington. *J. Air Pollut. Control Assoc.* 26(3):224-230. *Pestic. Abstr.* 9(5):323, 1976.
64. Feung, C. S., R. H. Hamilton, and R. O. Mumma. 1973. Metabolism of 2,4-dichlorophenoxyacetic acid. 4. Mass spectra and chromatographic properties of amino acid conjugates. *J. Agric. Food Chem.* 21(4):632-637. *Weed Abstr.* 23(7):148, 1974.
65. Fidelus, J. and M. Zietek. 1970. An indirect polarographic determination of 2,4-dichlorophenoxyacetic acid in biological material. (De.) *Mikrochim. Acta* 5:1010-1016. *Health Aspects Pestic.* 4(7):421, 1971. *Weed Abstr.* 21(3):246, 1972.
66. Foster, R. K. and R. B. McKercher. 1973. Extraction of ¹⁴C-labelled chlorophenoxyacetic acids from soil. *Can. J. Soil Sci.* 53:135-136. *Health Aspects Pestic.* 6(8):450, 1973. *Weed Abstr.* 23(6):126, 1974.
67. Frankoski, S. P. and S. Siggia. 1972. Analysis of carboxylic esters using alkali fusion reaction gas chromatography. *Anal. Chem.* 44(3):507-511. *Weed Abstr.* 22(7):152, 1973.
68. Freed, V. H. 1948. Qualitative reaction for 2,4-dichlorophenoxyacetic acid. *Science* 107:98-99.
69. Freed, V. H. and S. C. Traegde. 1958. A note on the chromotropic acid reagent for 2,4-D analysis. *Weeds* 6(2):211-212.
70. Fusi, P. and S. Mazzoni. 1969. Analysis of mixtures of herbicides based on simazine, 2,4-D and sodium trichloroacetate. (It.) *Ann. Chim.* 59(8/9):756-761. *Weed Abstr.* 21(1):70, 1972.

G
—

71. Gabor, T., P. Hencsei, G. Mato-Kovacs, E. Brandt-Petrik, and J. Nagy. 1973. Spectrophotometric determination of triazine and phenoxyacetic acid derivatives in pesticides. (De.) *Period. Polytech., Chem. Eng.* 17(3):219-231. *Weed Abstr.* 24(4):82, 1975.
72. Garbrecht, T. P., Sr. 1970. Rapid esterification of dicamba and chlorophenoxy acids with N,O-bis(trimethylsilyl) acetamide for gas chromatographic analysis. *J. Assoc. Off. Anal. Chem.* 53(1):70-73. *Weed Abstr.* 20(1):53, 1971.

73. Geike, F. 1972. Use of the enzymic inhibition of phenoxyalkanecarboxylic acid herbicides for their thin-layer chromatographic identification. (De.) J. Chromatogr. 72:333-342. Weed Abstr. 23(2):41, 1974.
74. Gesink, R. W., J. W. Akerman, and W. Hurtt. 1971. Alfalfa seed bioassay for aqueous solutions of orange. Proc. West. Soc. Weed Sci. 24:27. Weed Abstr. 22(7):152, 1973.
75. Givran, V. 1973. Considerations in the direct spectrophotometric assessment in the UV range of some pesticide combinations. (Ro.) Igiena 22(2):111-115.
76. Glaze, N. C. and M. Wilcox. 1966. GLC analysis for hydroxydichlorophenoxyacetic acids in roots treated with 2,4-D. Soil Crop Sci. Soc. Fla., Proc. 26:271-279.
77. Glaze, N. C. and M. Wilcox. 1968. Gas chromatographic analysis of hydroxydichlorophenoxyacetic acids. J. Chromatogr. 34(3):391-393. Weed Abstr. 20(1):52-53, 1971.
78. Glennie-Holmes, M. 1972. A rapid method for the determination of total acid equivalence of sodium salt pesticides using a cationic ion exchange resin. Pestic. Sci. 3(6):681-684. Weed Abstr. 22(10):256, 1973.
79. Goerlitz, D. F. and W. L. Lamar. 1965. Microcoulometric gas chromatographic analysis of selected herbicides in water. U.S. Geological Survey, Water Resource Division, Open File Report; Menlo Park, Calif. 11 p.
80. Golovkin, G. V., V. F. Snegirev, M. Aturyan, and M. M. Dovlatyan. 1974. Determining the volatility of 2,4-D derivative herbicides by gas liquid chromatography. (Ru.) Khim. Sel'sk. Khoz. 12(4):307-310. Weed Abstr. 24(5):123, 1975.
81. Goodin, J. R. and W.-C. Chang. 1969. A new selective bioassay for Tordon in water. Down Earth 24(4):4-5. Weed Abstr. 20(5):371, 1971.
82. Gordon, N. and M. Beroza. 1952. Spectrophotometric determination of small quantities of 2,4-dichlorophenoxyacetic acid and 2,4,5-trichlorophenoxyacetic acid. Anal. Chem. 24(12):1968-1971.
83. Gore, R. C., R. W. Hannah, S. C. Pattacini, and T. J. Porro. 1971. Infrared and ultraviolet spectra of seventy-six pesticides. J. Assoc. Off. Anal. Chem. 54(5):1040-1082. Weed Abstr. 21(3):244, 1972.
84. Goza, S. W. 1972. Infrared analysis of pesticide formulations. J. Assoc. Off. Anal. Chem. 55(5):913-917.
85. Gramlich, J. V. and R. E. Frans. 1964. Kinetics of *Chlorella* inhibition by herbicides. Weeds 12(3):184-189.
86. Grover, R. 1975. A method for determining the volatility of herbicides. Weed Sci. 23(6):529-532. Weed Abstr. 25(9):300, 1976.

87. Grover, R. 1976. Relative volatilities of ester and amine forms of 2,4-D. *Weed Sci.* 24(1):26-28. *Pestic. Abstr.* 9(5):330, 1976.
88. Guardigli, A., W. Chow, and M. S. Lefar. 1971. Determination of some acidic herbicides by thin-layer chromatography. *J. Agric. Food Chem.* 19(6):1181-1182. *Weed Abstr.* 21(5):411-412, 1972.
89. Gunther, F. A. 1962. Instrumentation in pesticide residue determinations. *Advan. Pest Control Res.* 5:191-319.
90. Gutenmann, W. H. and D. J. Lisk. 1963. Rapid determination of 4(2,4-DB) and a metabolite, 2,4-D, in treated forage by electron affinity spectroscopy. *J. Agric. Food Chem.* 11(4):304-306.
91. Gutenmann, W. H. and D. J. Lisk. 1964. Gas chromatographic method for silvex. *J. Am. Water Works Assoc.* 56:189-190.
92. Gutenmann, W. H. and D. J. Lisk. 1964. Rapid method for MCP in soil by electron affinity determination of 2-chloroethyl ester. *J. Assoc. Off. Agric. Chem.* 47(2):353-354.

H

93. Hagi, I., J. Oyama, and O. Otari. 1973. Analysis of residues of MCPA derivatives in crops and soil. A method for analysis of 2-chloro-*o*-tolylxyacetanilide, allyl 2-chloro-*o*-tolylacetate, ethyl 2-chloro-*o*-tolylacetate, and sodium 2-chloro-*o*-tolylacetate residues. (Ja.) *Noyaku Kagaku* 1(2):82-83. *Pestic. Abstr.* 7(1):54, 1974.
94. Hagin, R. D. and D. L. Linscott. 1965. Determination of 4-(2,4-dichlorophenoxy)-butyric acid (2,4-DB) and 2,4-dichlorophenoxyacetic acid (2,4-D) in forage plants. *J. Agric. Food Chem.* 13(2):123-125.
95. Hagin, R. D., D. L. Linscott, R. N. Roberts, and J. E. Dawson. 1966. Carotenoid pigments in plants. Major interfering substances in determining 2,4-D, a metabolite of 2,4-DB. *J. Agric. Food Chem.* 14(6):630-632.
96. Hammond, H. 1973. Free acid in esters of 2,4-dichlorophenoxyacetic acid and 2,4,5-trichlorophenoxyacetic acid and their formulations. *J. Assoc. Off. Anal. Chem.* 56(3):596-597. *Health Aspects Pestic.* 6(10):572, 1973. *Weed Abstr.* 22(10):256, 1973.
97. Hargreaves, P. A. and S. H. Rapkins. 1976. A simple method for the analysis of picloram and 2,4-D or 2,4,5-T in mixtures and commercial formulations. *Pestic. Sci.* 7:515-520. *Pestic. Abstr.* 10(4):241, 1977.
98. Hattula, M. L. and S. Riihimäen. 1976. Application of a new glass capillary chromatographic technique in the analysis of phenoxyacetic acid herbicides. *Bull. Environ. Contam. Toxicol.* 16(3):355-359. *Pestic. Abstr.* 10(2):97, 1977.

99. Helling, C. S. 1971. Pesticide mobility in soils. I. Parameters of soil thin-layer chromatography. Proc. Soil Sci. Soc. Am. 35(5): 732-737.
100. Helling, C. S. 1971. Pesticide mobility in soils. II. Applications of soil thin-layer chromatography. Proc. Soil Sci. Soc. Am. 35(5): 737-743.
101. Helling, C. S. 1971. Pesticide mobility in soils. III. Influence of soil properties. Proc. Soil Sci. Soc. Am. 35(5):743-748.
102. Hazemoto, N., N. Kamo, and Y. Kobatake. 1976. Ion selective electrode for 2,4-dichlorophenoxyacetic acid. J. Assoc. Off. Anal. Chem. 59(5):1097-1100.
103. Hendrickson, R. and W. R. Meagher. 1969. Spray residues of 2,4-D and 2,4,5-T in pineapple orange peel. J. Agric. Food Chem. 17(3):601-603.
104. Hesselberg, R. J. and J. L. Johnson. 1972. Column extraction of pesticides from fish, fish food and mud. Bull. Environ. Contam. Toxicol. 7(2/3):115-120.
105. Hitchcock, A. E., P. W. Zimmerman, and H. Kirkpatrick, Jr. 1953. A simple, rapid biological method for determining the relative volatility of esters of 2,4-D and 2,4,5-T. Contrib. Boyce Thompson Inst. 17(3):243-263.
106. Horowitz, M. 1976. Bioassay techniques for foliar-applied herbicides. Residue Rev. 61:113-123.
107. Horwitz, W. (Ed.) 1970. 2,4-Dichlorophenoxyacetic acid (2,4-D) (48) - Official Final Action. P 94. In Official Methods of Analysis of the Association of Official Analytical Chemists. Association of Official Analytical Chemists; Washington, D.C. 20044.
108. Horwitz, W. (Ed.) 1970. Total chlorine in compounds of 2,4-D and 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) in liquid herbicides - Official Final Action. P 95. In Official Methods of Analysis of the Association of Official Analytical Chemists. Association of Official Analytical Chemists; Washington, D.C. 20044.
109. Horwitz, W. (Ed.) 1970. Volatility of ester forms of hormone-type herbicides - Official Final Action. P 96-97. In Official Methods of Analysis of the Association of Official Analytical Chemists. Association of Official Analytical Chemists; Washington, D.C. 20044.
110. Howard, S. F. and G. Yip. 1971. Diazomethane methylation of a mixture of chlorophenoxy acids and dinitrophenols. J. Assoc. Off. Anal. Chem. 54(4):970-974.
111. Hurle, K. 1977. A comparison of bioassays with chemical methods of analysis for the determination of atrazine, 2,4-D, DNOC and napropamide in the soil. (De.) Weed Res. 17:25-32.

J

112. Jensen, D. J. and E. D. Schall. 1966. Determination of vapor pressures of some phenoxyacetic herbicides by gas-liquid chromatography. *J. Agric. Food Chem.* 14(2):123-126.
113. Johnson, E. R., T. C. Yu, and M. L. Montgomery. 1977. Trapping and analysis of atmospheric residues of 2,4-D. *Bull. Environ. Contam. Toxicol.* 17(3):369-372.

K

114. Kanazawa, J. and T. Masuda. 1973. Analytical methods for pesticide residues in soil and crops. Part 2. (Ja.) *Nippon Dojo Hiriyogaku Zasshi* 44(9):342-354. *Pestic. Abstr.* 7(12):817, 1974.
115. Kanazawa, J., T. Masuda, H. Iizuka, T. Yamada, and T. Suzuki. 1973. Analytical methods for determining pesticide residues in soil and crops. V. (Ja.) *Nippon Dojo Hiriyogaku Zasshi* 44(12):491-502. *Pestic. Abstr.* 8(7):492, 1975.
116. Kennedy, M. V., B. J. Stojanovic, and F. L. Shuman, Jr. 1972. Analysis of decomposition products of pesticides. *J. Agric. Food Chem.* 20(2):341-343. *Weed Abstr.* 22(1):23, 1973.
117. Ketchersid, M. L., O. H. Fletchall, P. W. Santelmann, and M. G. Merkle. 1970. Residues in sorghum treated with the isooctyl ester of 2,4-D. *Pestic. Monit. J.* 4(3):111-113.
118. Khan, S. U. 1975. Chemical derivatization of herbicide residues for gas liquid chromatographic analysis. *Residue Rev.* 59:21-50. *Pestic. Abstr.* 9(3):198, 1976.
119. Khan, S. U. 1975. Electron capture gas-liquid chromatographic method for the simultaneous analysis of 2,4-D, dicamba, and mecoprop residues in soil, wheat, and barley. *J. Assoc. Off. Anal. Chem.* 58(5):1027-1031. *Pestic. Abstr.* 8(11):774, 1976.
120. Kratky, B. A. and G. F. Warren. 1971. The use of three simple, rapid bioassays on forty-two herbicides. *Weed Res.* 11:257-262.

L

121. Larose, R. H. and A. S. Y. Chau. 1973. Herbicide analysis: Relationship between molecular structure and retention index. *J. Assoc. Off. Anal. Chem.* 56(5):1183-1187. *Weed Abstr.* 23(6):126, 1974.
122. Larose, R. H. and A. S. Y. Chau. 1974. Herbicide analysis: Relationship between molecular structure and retention index. *Pollut. Abstr.* 5(3):138. *Pestic. Abstr.* 7(1):52, 1974.

123. Leasure, J. K. 1958. A study of some bioassay methods for herbicide volatility. *Weeds* 6(3):310-314.
124. Leoni, V. 1971. The separation of fifty pesticides and related compounds and polychlorobiphenyls into four groups by silica gel micro-column chromatography. *J. Chromatogr.* 62(1):63-71. *Weed Abstr.* 22(5):96, 1973.
125. LeTourneau, D. and N. Krog. 1952. The use of chromotropic acid for the quantitative determination of 2,4-dichlorophenoxyacetic acid. *Plant Physiol.* 27:822-827.
126. Li, M. F. and C. Jordan. 1969. Use of spinner culture cells to detect water pollution. *J. Fish. Res. Board Can.* 26(5):1378-1382.
127. Løkke, H. 1975. Analysis of free and bound chlorophenoxy acids in cereals. *Bull. Environ. Contam. Toxicol.* 13(6):730-736. *Pestic. Abstr.* 8(9):607, 1976. *Weed Abstr.* 24(4):82, 1975.
128. Lopez-Gonzalez, J. de D. and C. Gonzalez Gomez. 1970. Radiochemical determination of carbon-14-labeled DDT and 2,4-D acid. (Es.) *An. Quim.* 66(3):263-269. *Health Aspects Pestic.* 4:353, 1971. *Weed Abstr.* 20(6):434, 1971.
129. Lyndsay, R. V. and G. S. Hartley. 1963. Studies of the response of plants to root-applied herbicides. I. The effect of localized application (variation horizontal). *Weed Res.* 3:195-204.
130. Lyndsay, R. V. and G. S. Hartley. 1966. Studies of the response of plants to root-applied herbicides. II. Further observations on the effect of localized application. *Weed Res.* 6:221-232.

M
—

131. MacRae, I. C. and M. Alexander. 1964. Use of gas chromatography for the demonstration of a pathway of phenoxy herbicide degradation. *Agron. J.* 56:91-92.
132. Malina, M. 1971. Collaborative study of infrared analysis of dicamba-2-methyl-4-chlorophenoxyacetic acid and dicamba-2,4-dichlorophenoxyacetic acid formulations. *J. Assoc. Off. Anal. Chem.* 54(3):706-710. *Weed Abstr.* 21(3):246, 1972.
133. Mamina, F. A., T. F. Akhunov, A. I. Gerasimova, L. N. Sharif'yanova, and I. N. Lomot'ko. 1972. Analysis of the butyl ester of 2,4-dichlorophenoxyacetic acid. (Ru.) *Probl. Anal. Khim.* 2:77-80. *Pestic. Abstr.* 7(2):108, 1974.
134. Marquardt, R. P. and E. N. Luce. 1951. Determination of small amounts of 2,4-dichlorophenoxyacetic acid in milk. *Anal. Chem.* 23(10):1484-1486.

135. Marquardt, R. P. and E. N. Luce. 1955. Determination of 2,4-dichlorophenoxyacetic acid (2,4-D) in grain and seed. *J. Agric. Food Chem.* 3(1):51-53.
136. Marquardt, R. P. and E. N. Luce. 1961. A new basic procedure for determining phenoxy acid herbicides in agricultural products. *J. Agric. Food Chem.* 9(4):266-270.
137. Marquardt, R. P., H. P. Burchfield, E. E. Storrs, and A. Bevenue. 1964. 2,4-Dichlorophenoxyacetic acid. *Anal. Methods Pestic. Plant Growth Regul.* 4:95-116.
138. Matano, O., M. Yukimoto, O. Nishijima, and T. Kashiwa. 1971. Chemical and biological determination of 2,4,5-T in tetradifon formulations. (Ja.) *Noyaku Kensasho Hokoku* 11:32-36. *Weed Abstr.* 22(10):256, 1973.
139. McKone, C. E. and R. J. Hance. 1972. Determination of residues of 2,4,5-trichlorophenoxyacetic acid in soil by gas chromatography of the *n*-butyl ester. *J. Chromatogr.* 69:204-206. *Health Aspects Pestic.* 5(11):580-581, 1972. *Weed Abstr.* 22(12):319, 1973.
140. McLeod, H. A. and P. J. Wales. 1972. A low temperature cleanup procedure for pesticides and their metabolites in biological samples. *J. Agric. Food Chem.* 20(3):624-627. *Weed Abstr.* 22(5):96, 1973.
141. Meagher, W. R. 1966. Determination of 2,4-dichlorophenoxyacetic acid and 2-(2,4,5-trichlorophenoxy)propionic acid in citrus by electron capture gas chromatography. *J. Agric. Food Chem.* 14(4):374-377.
142. Meinard, C. 1971. A reagent for the detection of phenoxyacetic herbicides on thin-layer chromatography plates. (Fr.) *J. Chromatogr.* 61(1):173. *Health Aspects Pestic.* 5:93-94, 1972.
143. Meinard, C. 1971. Determination of phenoxyacetic acids by thin-layer chromatography. (Fr.) *Phytiatr. Phytopharm.* 20:257-260. *Weed Abstr.* 23(8):179, 1974.
144. Merkle, M. G. and F. S. Davis. 1966. The use of gas chromatography for determining the translocation of picloram and 2,4,5-T. *Proc. South. Weed Conf.* 19:-57-561.
145. Mestres, R., G. Leonardi, M. Dudieuzere, and Ch. Chevallier. 1969. Pesticide residues. XX. Pesticide residues in natural waters. Part 2. Residues from chlorophenoxy type herbicides. (Fr.) *Ann. Falsif. Expert. Chim.* 62(686):214-220.
146. Milner, M. P., F. J. Holzer, and J. B. Leary. 1963. Simultaneous determination of esters of 2,4-D and 2,4,5-T in pesticide formulations. *J. Assoc. Off. Anal. Chem.* 46(4):655-659.
147. Mitchell, L. C. 1961. Separation and identification of chlorinated organic pesticides by paper chromatography. XII. The two herbicides, 2,4-D and 2,4,5-T. *J. Assoc. Off. Anal. Chem.* 44(4):720-722.

148. Morton, H. L., F. S. Davis, and M. G. Merkle. 1962. Radioisotopic and gas chromatographic methods for measuring absorption and translocation of 2,4,5-T by mesquite. *Weed Sci.* 16:88-91.
149. Müller, B. 1973. On the determination of pesticide residues in bee honey. Part II. Semiquantitative thin-layer chromatographic determination of herbicide residues in bee honey. (De.) *Nahrung* 17(3):387-392. *Pestic. Abstr.* 7(3):165, 1974.
150. Müller, I. 1971. Analysis of Tordon formulations by ultraviolet spectrophotometry. *J. Agric. Food Chem.* 19(5):1035-1036. *Weed Abstr.* 21(3):247, 1972.
151. Mullison, W. R. 1951. The tomato as a test plant for growth-regulators. *Bot. Gaz.* 112:521-524.
152. Munro, H. E. 1972. Determination of 2,4-dichlorophenoxyacetic acid and 2,4,5-trichlorophenoxyacetic acid in tomato plants and other commercial crops by microcoulometric gas chromatography. *Pestic. Sci.* 3(4):371-377. *Health Aspects Pestic.* 6(5):283-284, 1973. *Weed Abstr.* 22(2):38, 1973.
153. Munro, H. E. 1977. Determination of individual esters of 2,4-D and 2,4,5-T in commercial crops. *Pestic. Sci.* 8:157-162.
154. Muzik, T. J. and J. W. Whitworth. 1963. Growth-regulating chemicals persist in plants: Qualitative bioassay. *Science* 140(3572):1212-1213.
155. Muzik, T. J. and W. G. Mauldin. 1964. Influence of environment on the response of plants to herbicides. *Weeds* 12(2):142-145.

N

—

156. Niederschulte, U. and K. Ballschmiter. 1974. Isolation and pre-concentration of chlorophenoxyacetic acids from water with macroreticular resins XAD-2 and XAD-7. (De.) *Fresenius Z. Anal. Chem.* 269(5):360-363. *Pestic. Abstr.* 7(8):542, 1974.
157. Noll, M. and U. Bauer. 1973. Rapid sensitive herbicide bioassay by inhibition of trichome-migration of bluegreen algae. (De.) *Zentralbl. Bakteriol., Parasitenkd., Infektionskr. Hyg., Abt. 1: Orig., Reihe B* 157:178-183. *Pestic. Abstr.* 7(2):113, 1974.

O

—

158. Ott, D. E. and H. O. Friestad. 1977. Automated analytical system for phenols incorporated into screening method suitable for determination of 2-methyl-4-chlorophenoxyacetic acid and/or 2,4-dichlorophenoxyacetic acid herbicide residues in water. *J. Assoc. Off. Anal. Chem.* 60(1):218-223.

159. Oyama, A., O. Ogyu, and I. Hagi. 1975. Several problems and their countermeasures in residue analysis. (Ja.) Noyaku Kagaku 3(2): 86-87. Pestic. Abstr. 8(11):778, 1976.

P
—

160. Parker, C. 1966. The importance of shoot entry in the action of herbicides applied to the soil. Weeds 14:117-121.
161. Pavlova, N. N., D. I. Chkanikov, and A. M. Makeyev. 1972. Determination of halophenoxyacetic acids in plants. (Ru.) Probl. Anal. Khim. 2:99-104. Pestic. Abstr. 7(2):108, 1974.
162. Petrosini, G., F. Tafuri, M. Businelli, and L. Scarponi. 1971. Residues of 2,4,5-TP in rice. (It.) Agrochimica 15(6):485-493. Health Aspects Pestic. 5:251, 1972.
163. Pillay, A. R. and Y. T. Tchan. 1972. Study of soil algae. VII. Adsorption of herbicides in soil and prediction of their rate of application by algal methods. Plant Soil 36:571-594.
164. Plato, C. and A. R. Glasgow, Jr. 1969. Differential scanning calorimetry as a general method for determining the purity and heat of fusion of high-purity organic chemicals. Application to 95 compounds. Anal. Chem. 41(2):330-336.
165. Poluboyarinova, I. V. 1972. Separation and determination of herbicides of the group of 2,4-D acid and 2,4-D butyl ester in water. (Ru.) Probl. Anal. Khim. 2:115-117. Pestic. Abstr. 7(2):109, 1974.
166. Pope, J. D., Jr., W. S. Cox, III, and A. R. Grzenda. 1966. Determination of silvex and its low volatile esters in water and muds. Advan. Chem. Ser. 60:200-206.
167. Purkayastha, R. 1969. Direct detection of ionizable herbicides by electrophoresis. Bull. Environ. Contam. Toxicol. 4(4):246-255.
168. Purkayastha, R. 1972. Residue determination of 2,4-D, 2,4,5-T and dicamba in soil by electron capture gas chromatography and their persistence in marsh soil. Am. Chem. Soc., Abstr. Pap., Nat. Meet., Pestic. Chem. Sec., Abstr. No. 38. Weed Abstr. 21(5):412, 1972.
169. Purkayastha, R. 1973. Response of the electrolytic conductivity detector in the oxidative mode to herbicides and its use in residue analysis in soil and water by gas chromatography. Am. Chem. Soc., Abstr. Pap., Nat. Meet., Pestic. Chem. Sec., Abstr. No. 29.
170. Purkayastha, R. 1974. Simultaneous determination of 2,4-dichlorophenoxyacetic acid, 2,4,5-trichlorophenoxyacetic acid and 2-methoxy-3,6-dichlorobenzoic acid in soil and water by gas chromatography with electron capture detector. J. Agric. Food Chem. 22(3):453-458. Pestic. Abstr. 7(8):543, 1974. Weed Abstr. 24(3):53, 1975.

171. Pursley, P. L. and E. D. Schall. 1965. Gas chromatographic determination of 2,4-D and 2,4,5-T and their derivatives in commercial formulations. *J. Assoc. Off. Anal. Chem.* 48(2):327-333.

Q
—

172. Que Hee, S. S. and R. G. Sutherland. 1974. Volatilization of various esters and salts of 2,4-D. *Weed Sci.* 22(4):313-318. *Pestic. Abstr.* 7(12):779, 1974. *Weed Abstr.* 24(4):85, 1975.
173. Que Hee, S. S. and R. G. Sutherland. 1975. A specific gas-liquid chromatographic method for analysis of some amine salts of 2,4-dichlorophenoxyacetic acid. *J. Agric. Food Chem.* 23(5):1007-1008. *Pestic. Abstr.* 8(12):850, 1976. *Weed Abstr.* 25(5):150, 1976.
174. Que Hee, S. S., R. G. Sutherland, and M. Vetter. 1975. GLC analysis of 2,4-D concentrations in air samples from central Saskatchewan in 1972. *Environ. Sci. Technol.* 9(1):62-66. *Pestic. Abstr.* 8(3):168-169, 1975. *Weed Abstr.* 24(9):240, 1975.

R
—

175. Ready, D. and V. Q. Grant. 1947. A rapid sensitive method for determination of low concentrations of 2,4-dichlorophenoxyacetic acid in aqueous solution. *Bot. Gaz.* 109(1):39-44.
176. Reeves, J. M., E. B. Bradley, and C. A. Frenzel. 1973. Detection of salts of 2,4-D in aqueous solution by laser Raman spectroscopy. *Water Res.* 7(10):1417-1429. *Pestic. Abstr.* 7(2):112, 1974. *Weed Abstr.* 23(12):313, 1974.
177. Rivers, J. B., W. L. Yauger, Jr., and H. W. Klemmer. 1970. Simultaneous gas chromatographic determination of 2,4-D and dicamba in human blood and urine. *J. Chromatogr.* 50(2):334-337. *Weed Abstr.* 20(3):206, 1971.
178. Roder, C. H. and H. Laass. 1976. Analysis of phenoxyalkanoic acids. Analytical methods for the determination of 2,4-D, MCPA, as well as mecoprop salts in liquid and solid form. (De.) *Nachrichtenbl. Dtsch. Pflanzenschutzdienstes (Braunschweig)* 28(11):170-173. *Pestic. Abstr.* 10(3):155, 1977.
179. Rummens, F. H. A. 1974. Proton fourier transform NMR as a trace analysis tool: Optimization of signal-to-noise. P 219-237. *In* *Mass Spectrometry and NMR Spectroscopy in Pesticide Chemistry*. Plenum Press; New York, N.Y. *Pestic. Abstr.* 7(12):815-816, 1974.

S
—

180. Savory, B. M. 1973. Relative phytotoxicity of 2,4-D ester/ioxynil ester herbicides. *Int. Sugar J.* 75(1):195-199. *Weed Abstr.* 23(3):58, 1974.

181. Schulten, H. R. 1976. Field desorption mass spectrometry of commercial pesticides and mixtures of pesticides. *J. Agric. Food Chem.* 24(4):743-749.
182. Schultz, D. P. 1973. Dynamics of a salt of (2,4-dichlorophenoxy) acetic acid in fish, water, and hydrosol. *J. Agric. Food Chem.* 21(2):186-192. *Health Aspects Pestic.* 6(6):322, 1973. *Weed Abstr.* 23(1):20, 1974.
183. Scoggins, J. E. and C. H. Fitzgerald. 1969. Rapid methylation of chlorophenoxyacetic acid herbicides with dimethyl sulfate for gas chromatographic analyses. *J. Agric. Food Chem.* 17(1):156-157.
184. Shafik, M. T., H. C. Sullivan, and H. F. Enos. 1971. A method for determination of low levels of exposure to 2,4-D and 2,4,5-T. *Int. J. Environ. Anal. Chem.* 1:23-33.
185. Shafik, M. T., H. C. Sullivan, and H. F. Enos. 1973. Multiresidue procedure for halo- and nitrophenols. Measurement of exposure to biodegradable pesticides yielding these compounds as metabolites. *J. Agric. Food Chem.* 21(2):295-298. *Weed Abstr.* 22(9):228, 1973.
186. Sheldon, M. G., P. Johnson, W. H. Robison, and J. E. Peterson. 1963. Laboratory studies of pesticide using carbon-14 labeled compounds. P 46. *In Pesticide Wildlife Studies. A review of fish and wildlife service investigations during 1961 and 1962.* U.S. Fish Wildl. Serv., Cir. No. 167.
187. Shinova, R. P. 1974. Separate determination of pesticides by thin-layer chromatography on ready-made "Silufoi" sheets. (Ru.) *Gig. Sanit.* 39(7):52-53. *Pestic. Abstr.* 8(1):53, 1975.
188. Shtabskiy, B. M., M. I. Gzhegot'skiy, and V. Z. Martynyuk. 1971. Application of the in vivo staining method to the detection of the effects of small doses of chemical substances. (Ru.) *Gig. Sanit.* 36(1):51-53. *Health Aspects Pestic.* 5(12):610, 1972.
189. Sindelar, L. and O. Makovcova. 1971. Use of Brdicka's reaction on proteins for the determination of the activity of some herbicides. (De.) *Biol. Plant.* 13(1):57-59. *Weed Abstr.* 22(8):191, 1973.
190. Skelly, N. E., R. J. Russell, and D. F. Porter. 1976. Collaborative study of the high-pressure liquid chromatographic analysis of picloram-2,4-D formulations. *J. Assoc. Off. Anal. Chem.* 59(4):748-752.
191. Skelly, N. E., T. S. Stevens, and D. A. Mapes. 1977. Isomer-specific assay of ester and salt formulations of 2,4-dichlorophenoxyacetic acid by automated high pressure liquid chromatography. *J. Assoc. Off. Anal. Chem.* 60(4):868-872.

192. Smith, A. E. and A. Fitzpatrick. 1971. A thin-layer chromatographic procedure for the detection in soils and waters of herbicide residues commonly used in Saskatchewan. *J. Chromatogr.* 57(2):303-308. *Weed Abstr.* 21(3):244, 1972.
193. Smith, A. E. 1976. Use of acetonitrile for the extraction of herbicide residues from soil. *J. Chromatogr.* 129:309-314. *Pestic. Abstr.* 10(3):150, 1977.
194. Storrs, E. E. and H. P. Burchfield. 1962. Internal standards in the analysis of chlorine-containing herbicides by gas chromatography. *Contrib. Boyce Thompson Inst.* 21(7):423-437.
195. Suffet, I. H. and S. D. Faust. 1972. Liquid-liquid extraction of organic pesticides from water: The ρ -value approach to quantitative extraction. *Advan. Chem. Ser.* 111:11-25.
196. Suffet, I. H. 1973. The ρ -value approach to quantitative liquid-liquid extraction of pesticides and herbicides from water. 2. Selection of water:solvent ratios and number of extractions. *J. Agric. Food Chem.* 21(2):288-294.
197. Suffet, I. H. 1973. The ρ -value approach to quantitative liquid-liquid extraction of pesticides and herbicides from water. 3. Liquid-liquid extraction of phenoxy acid herbicides from water. *J. Agric. Food Chem.* 21(4):591-598. *Health Aspects Pestic.* 6(10):570, 1973. *Weed Abstr.* 23(5):100, 1974.
198. Sund, K. A. and N. Nomura. 1963. Laboratory evaluation of several herbicides. *Weed Res.* 3:35-43.
199. Swanson, C. P. 1946. A simple bio-assay method for the determination of low concentrations of 2,4-dichlorophenoxyacetic acid in aqueous solutions. *Bot. Gaz.* 107:507-509.

T
—

200. Takahashi, M., T. Numata, T. Oya, and J. Takano. 1973. Pesticide residue analysis in rice straw. (Ja.) *Noyaku Kagaku* 1(2):73-74. *Pestic. Abstr.* 7(1):53, 1974.
201. Takahashi, M., T. Numata, and J. Takano. 1974. Residue analysis of MCPB and its metabolite, MCPA, utilizing nitration. (Ja.) *Noyaku Kagaku* 2(2):51-53. *Pestic. Abstr.* 7(12):817-818, 1974.
202. Takeshita, R., H. Akagi, and Y. Sakagami. 1971. Thin-layer chromatography of chlorinated phenoxy herbicides on polyamide layers. (Ja.) *Eisei Kagaku* 17(5):337-340. *Health Aspects Pestic.* 6(3):157, 1973.

203. Thielemann, H. 1972. Thin-layer chromatographic separation and identification of herbicidal substances on prepared (aluminum) foil. (De.) Fresenius Z. Anal. Chem. 262(3):192. Health Aspects Pestic. 6(3):158, 1973.
204. Thielemann, H. 1973. Separation and identification of herbicidal plant protecting agents by thin-layer chromatography. (De.) Z. Chem. 13(5):226-227. Pestic. Abstr. 8(7):498, 1975.
205. Thielemann, H. 1974. Detection limits of herbicides with different spray agents on ready-made foils for thin-layer chromatography. (De.) Fresenius Z. Anal. Chem. 272(4):286. Pestic. Abstr. 8(3):169, 1975.
206. Thier, H. P. 1970. Detection and determination of residues of acid and phenol herbicides in plant material. (De.) Dtsch. Lebensm.-Rundsch. 66(11):393-398. Weed Abstr. 21(5):411, 1972.
207. Thompson, J. F., A. C. Walker, and R. F. Moseman. 1969. Evaluation of eight gas chromatographic columns for chlorinated pesticides. J. Assoc. Off. Anal. Chem. 52(6):1263-1277.
208. Thornburg, W. 1971. Pesticide residues. Anal. Chem. 43(5):145-162. Weed Abstr. 20(4):282, 1971.
209. Tibenska, M. and J. Horacek. 1973. A contribution to the estimation of the herbicide 2-methyl-4-chlorophenoxyacetic acid (MCPA) in water. (Cs.) Cesk. Hyg. 18(1):27-32.
210. Tokes, B. 1976. Polarographic analysis of some chlorophenoxyacetic acid herbicides. (Ro.) Igiena 25(2):129-132. Pestic. Abstr. 10(3):156, 1977.
211. Toth, A., Z. Ronane-Kovacs, and E. Balazs. 1971. Gas-chromatographic determination of 2,4-dichlorophenoxyacetic acid residues. (Hu.) Kerteszetiigy. Kozl. 35(3):309-316. Pestic. Abstr. 7(4):268, 1974. Weed Abstr. 22(7):152, 1973.
212. Tsitovich, I. K. and E. A. Kuz'menko. 1972. Ion exchange concentration and determination of TCA and 2,4-D in soil and plant material. (Ru.) Probl. Anal. Khim. 2:155-157. Pestic. Abstr. 7(2):111, 1974. Weed Abstr. 24(5):123, 1975.
213. Tsitovich, I. K. and E. A. Kuz'menko. 1973. Exchange constants of the chlorophenoxyacetate ion for the chloride ion and the possibilities of chromatographic separation. Zh. Anal. Khim. 28(2):341-344. Weed Abstr. 24(11):313, 1975.
- U
—
214. Uporova, G. I. and S. Yu. Shtiler. 1973. Determination of dicotex in air by thin-layer chromatography. (Ru.) Gig. Tr. Prof. Zabol. 17:54-55. Pestic. Abstr. 7(12):810, 1974.

V
—

215. Van Bragt, J., L. M. Rohrbaugh, and S. H. Wender. 1965. The effect of 2,4-dichlorophenoxyacetic acid on the rutin content of tomato plants. *Phytochemistry* 4:963-965.
216. Van Peteghem, C. H. and A. M. Heyndrickx. 1973. Identity confirmation of chlorophenoxyacid herbicides residues. *Meded. Fac. Landbouwwet., Rijksuniv. Gent* 38(3):857-863. *Pestic. Abstr.* 8(2):117-118, 1975.
217. Van Peteghem, C. H. and A. M. Heyndrickx. 1975. Spectroscopic properties of the methyl esters of chlorophenoxy acid herbicides. *J. Assoc. Off. Anal. Chem.* 58(5):1001-1012. *Pestic. Abstr.* 8(11):773, 1976. *Weed Abstr.* 25(9):301, 1976.
218. Van Peteghem, C. H. and A. M. Heyndrickx. 1976. Gas chromatographic determination of 2,4-dichlorophenoxyacetic acid (2,4-D) by mass fragmentography with a deuterated internal standard. *J. Agric. Food Chem.* 24(3):635-637. *Pestic. Abstr.* 9(8):594, 1976.
219. Vasyagina, R. D. and V. D. Chmil'. 1973. Determination of 2,4-dichlorophenoxyacetic acid butyl ester residues in the environment by gas-liquid chromatography. (Ru.) *Gig. Sanit.* 38(5):69-72. *Weed Abstr.* 23(12):313-314, 1974.
220. Vasyagina, R. D. and V. D. Chmil'. 1973. GLC determination of 2,4-DB residues in potatoes. (Ru.) *Vopr. Pitan.* 4:78-80. *Pestic. Abstr.* 7(2):112, 1974.
221. Vergeychik, T. Kh. and E. O. Grayaznova. 1969. Determination of 2,4-dichlorophenoxyacetic acid in biological material. *Farm Zh. (Kiev)* 24(6):54-59. *Health Aspects Pestic.* 4:301, 1971. *Pestic. Abstr.* 7(11):758-759, 1974.
222. Vergeychik, T. Kh. 1972. Photometric determination of chlorophenols in technical herbicidal preparations of the 2,4-D group. (Ru.) *Probl. Anal. Khim.* 2:28-32. *Pestic. Abstr.* 7(2):105, 1974.
223. Vergeychik, T. Kh. and V. A. Linnikova. 1972. Determination of sodium salt of 2-methyl-4-chlorophenoxyacetic acid in cadaver liver. (Ru.) *Sud. Med. Ekspert.* 15(2):40-43.

W
—

224. Warshowsky, B. and E. J. Schantz. 1950. Determination of 2,4-dichlorophenoxyacetic acid in soil. *Anal. Chem.* 22(3):460-462.
225. Westlake, W. E. 1963. *Pesticides.* *Anal. Chem.* 35(5):105-110.
226. Williams, S. and J. W. Cook. 1967. Pesticide residues. *Anal. Chem.* 39(5):142-157.

227. Wolkoff, A. W. and R. H. Larose. 1974. A highly sensitive technique for the liquid chromatographic analysis of phenols and other environmental pollutants. *J. Chromatogr.* 99:731-743. *Pestic. Abstr.* 8(2):117, 1975.
228. Woodham, D. W., W. G. Mitchell, and C. V. Loftis. 1969. An improved gas chromatographic method for the analysis of 2,4-D in soil. *Am. Chem. Soc., Abstr. Pap., Nat. Meet., Pestic. Chem. Sec., Abstr.* No. 5. *Weed Abstr.* 20(1):53, 1971.
229. Woodham, D. W., W. G. Mitchell, C. D. Loftis, and C. W. Collier. 1971. An improved gas chromatographic method for the analysis of 2,4-D free acid in soil. *J. Agric. Food Chem.* 19(1):186-188. *Weed Abstr.* 20(5):370, 1971.
230. Wright, F. C., J. C. Riner, and B. N. Gilbert. 1969. Gas chromatographic determination of erbon and two metabolites in biological materials. *J. Agric. Food Chem.* 17(6):1171-1173.

Y
—

231. Yip, G. 1962. Determination of 2,4-D and other chlorinated phenoxy alkyl acids. *J. Assoc. Off. Agric. Chem.* 45(2):367-376.
232. Yip, G. 1964. Herbicides and plant growth regulators. Paper chromatographic analysis of chlorophenoxy acids and esters in wheat. *J. Assoc. Off. Agric. Chem.* 47(2):343-345.
233. Yip, G. 1964. Herbicides and plant growth regulators. Determination of herbicides in oils. *J. Assoc. Off. Agric. Chem.* 47(6):1116-1119.
234. Yip, G. and R. E. Ney, Jr. 1966. Analysis of 2,4-D residues in milk and forage. *Weeds* 14:167-170.
235. Yip, G. 1971. Confirmation of chlorophenoxy acid herbicide residues by transesterification. *J. Assoc. Off. Anal. Chem.* 54(2):343-345.
236. Yip, G. 1971. Improved method for determination of chlorophenoxy acid residues in total diet samples. *J. Assoc. Off. Anal. Chem.* 54(4):966-969. *Weed Abstr.* 21(3):245, 1972.
237. Yip, G. 1972. Report on fungicides, herbicides, and plant growth regulators. *J. Assoc. Off. Anal. Chem.* 55(2):287-289.

Z
—

238. Zawadzka, H., H. Elbanowska, and M. Adamczewska. 1973. Determination of herbicides 2,4-D, dalapon, MCPA, 2,4-DP, MCPP, DNOC, DNBP and TCA in water and sewage by thin-layer chromatography. (Pl.) *Chem. Anal.* 18:943-949. *Pestic. Abstr.* 8(6):386-387, 1975.

239. Zero, M. 1972. Determination of herbicides derived from chlorophenoxyacetic acid (2,4-D and MCPA) in wheat and wheat flour. (Pl.) Rocz. Panstw. Zakl. Hig. 23(5):545-548. Chem. Abstr. 78(7):342, 1973.
240. Zielinski, W. L., Jr. and L. Fishbein. 1967. Gas chromatographic measurement of disappearance rates of 2,4-D and 2,4,5-T acids and 2,4-D esters in mice. J. Agric. Food Chem. 15(5):841-844.
241. Zweig, G. and J. Sherma. 1972. Silvex (2,4,5-TP). Anal. Methods Pestic. Plant Growth Regul. 6:688-690. Pestic. Abstr. 8(12):855, 1976.
242. Zweig, G. and J. Sherma. 1972. 2,4-Dichlorophenoxyacetic acid. Anal. Methods Pestic. Plant Growth Regul. 6:630-635. Pestic. Abstr. 8(12):857, 1976.

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