

CONTENTS

SECTION I: OPENING REMARKS AND KEYNOTE ADDRESS

1. Opening Remarks	3
<i>D. W. Barton</i>	
2. Perspectives on Fertilizer Use, Residue Utilization and Food Production.	5
<i>R. White-Stevens</i>	

SECTION II: APPLICATION OF WASTEWATERS TO LAND 27

3. Stopping the One-Way Flow of Nutrients from Farms to Cities; Benefits for Farmers and Cleaner Water.	29
<i>M. Gravitz</i>	
4. Ionic Distribution in a Spray Irrigation System	39
<i>P. L. Deese, R. F. Vaccaro, B. H. Ketchum, P. C. Bowker and M. R. Dennett</i>	
5. Land Application of Food Processing Wastewater	67
<i>D. O. Bridgman, W. A. Britton, B. A. Patrie and J. A. Lawson</i>	
6. Deer Creek Lake—On-Land Wastewater Treatment System	79
<i>D. J. Lambert and H. L. McKim</i>	
7. Physical Siting of Wastewater Land Treatment Installations.	95
<i>W. J. Hartman, Jr.</i>	

SECTION III: INTERACTIONS OF SLUDGE; SOIL AND CROP PRODUCTION

8. New Federal Perspectives on the Land Application of Sludge. <i>E. Claussen</i>	119
9. Guidance on Land Application of Municipal Sludge—EPA Construction Grants Program	
<i>R. K. Bastian</i>	

10. Environmental Assessment of Municipal Sludge Utilization at Nine Locations in the United States	135
<i>A. D. Otte and K. V. LaConde</i>	
11. Land Cultivation of Industrial Wastewaters and Sludges	147
<i>D. H. Bauer, D. E. Ross and E. T. Conrad</i>	
12. Impact on Farm Costs and Returns from Sludge Application in Forage Production.	157
<i>G. C. Reisner and R. L. Christensen</i>	
13. Economic Analysis of Recycling Sewage Sludge on Agricultural Land	169
<i>S. L. Ott and D. L. Forster</i>	
14. Crop Yields and Water Quality After Application of Sewage Sludge to an Agricultural Watershed	185
<i>C. E. Clapp, D. R. Duncomb, W. E. Larson, D. R. Linden R. H. Dowdy and R. E. Larson</i>	
15. The Potential Use of Forest Land as a Sludge Disposal Site	199
<i>R. C. Sidle</i>	
16. Fertilizer Value of Undigested and Digested Thermoradiation Treated Sewage Sludge on Calcareous Soil	217
<i>B. D. McCaslin and P. S. Titman</i>	
17. Differences in the Susceptibility of Soybean Varieties to Soil Cadmium.	229
<i>S. F. Boggess and D. E. Koeppel</i>	
18. Nutrient Usage and Heavy Metals Uptake by Sheep Fed Thermoradiated Undigested Sewage Solids.	239
<i>G. S. Smith, H. E. Kiesling and H. D. Sivinski</i>	

SECTION IV: NUTRIENT MANAGEMENT

19. Availability and Transformation of Sewage Sludge Nitrogen	257
<i>B. R. Sabey</i>	
20. Management of Fertilizer Nitrogen for Potatoes Consistent with Optimum Profit and Maintenance of Ground Water Quality	271
<i>D. R. Bouldin and G. W. Selleck</i>	
21. Use and Relative Environmental Effects of Fertilizers Applied to Cropland and Turf in a Mixed Rural and Suburban Area.	279
<i>K. S. Porter, L. B. Baskin and D. H. Zaeh</i>	

22. The Economic Trade-Offs of Commercial Nitrogen Fertilizers, Legumes and Animal Wastes in Midwest Agriculture	299
<i>T. J. Considine, R. E. Muller, Jr., R. M. Peart and O. C. Doering III</i>	
23. A Linear Programming Model for Dairy Farm Nutrient Management	319
<i>D. A. Haith and D. W. Atkinson</i>	
SECTION V: METHANE GENERATION	339
24. The Role of an Anaerobic Digester on a Typical Central Iowa Farm	341
<i>R. J. Smith, R. L. Fehr, J. A. Miranowski and E. R. Pidgeon</i>	
25. Experiences from Operating Full-Size Anaerobic Digesters	373
<i>S. Persson, R. W. Regan, H. D. Bartlett and A. E. Branding</i>	
26. Methane Production During Treatment of Food Plant Wastes by Anaerobic Digestion	381
<i>L. van den Berg and C. P. Lentz</i>	
27. Anaerobic Fermentation of Animal Wastes: Design and Operational Criteria	397
<i>G. R. Morris, W. J. Jewell and R. C. Loehr</i>	
28. A Comparison of an Anaerobic Digester and an Aeration System Treating Piggery Waste from the Same Source	415
<i>P. J. Mills</i>	
29. Anaerobic Digestion of Poultry Waste With and Without Acid Hydrolysis Pretreatment	
<i>P. Y. Yang and K. K. Chan</i>	
SECTION VI: ENERGY UTILIZATION AND PRODUCTION	437
30. An Energy and Economic Analysis of Conventional and Organic Wheat Farming	439
<i>G. M. Berardi</i>	
31. Use of Ginning Waste as an Energy Source	
<i>W. F. Lalor and M. L. Smith</i>	
32. Generation of Low-Btu Fuel Gas from Agricultural Residues Experiments with a Laboratory-Scale Gas Producer	
<i>R. O. Williams and B. Horsfield</i>	
33. Use of Crop Residues to Support a Municipal Electrical Utility	
<i>R. K. Koelsch, S. J. Clark, W. H. Johnson and G. H. Larson</i>	

SECTION VII: ANIMAL WASTE MANAGEMENT	507
34. Effects of Poultry Waste Effluent and Insecticides on Corn Production	509
<i>R. O. Hegg and H. D. Skipper</i>	
35. Practical Application of Aerobic Treatment and Land Application of Poultry Manure	521
<i>A. C. Anthonisen and D. H. Wagner</i>	
36. Economic Comparison of the Oxidation Ditch and High-Rise Manure Drying as Poultry Waste Management Alternatives	533
<i>J. H. Martin and R. C. Loehr</i>	
37. Management of Laying Hen Manure by Moisture Removal— Results of Several Research Investigations	549
<i>A. T. Sobel and D. C. Ludington</i>	
38. Storability of Partially Dried Laying Hen Manure	581
<i>D. C. Ludington and A. T. Sobel</i>	
39. Manure Residue as a Substrate for Protein Production via <i>Hermetia illucens</i> Larvae	599
<i>C. V. Booram, Jr., G. L. Newton, O. M. Hale and R. W. Barker</i>	
40. Land Application of Swine Waste Residue for Integrated Crop Production	605
<i>C. V. Booram, Jr.</i>	
41. A Fermentation Process for the Utilization of Swine Waste	621
<i>B. A. Weiner</i>	
42. Thermophilic Aerobic Digestion of Dairy Waste	637
<i>R. J. Cummings and W. J. Jewell</i>	
43. Performance of an Anaerobic Waste Treatment Lagoon System . .	659
<i>R. K. White, R. L. Curtner and R. H. Miller</i>	
44. Nutrient Budget in a Dairy Anaerobic Lagoon— Evaluation for Land Application	681
<i>D. F. Bezdicek, J. M. Sims, M. H. Ehlers, J. Cronrath and R. E. Hermanson</i>	
45. Effect of Manure on Plant Growth and Nitrate N in Soil Water . .	693
<i>L. F. Marriott, H. D. Bartlett and M. J. Green</i>	
46. Nutritional Value of Ensiled Crop Residue—Cattle Waste Mixtures.	701
<i>W. L. Braman and R. K. Abe</i>	
47. Economic Implications of Waste Effluent Regulations for Minnesota Dairy Processing Plant	711
<i>B. M. Buxton, S. J. Ziegler and J. A. Moore</i>	
INDEX	723