

## Julie D. Jastrow

Biosciences Division  
Argonne National Laboratory  
9700 South Cass Avenue  
Argonne, Illinois 60439

Phone: (630) 252-3226  
Email: [jdjastrow@anl.gov](mailto:jdjastrow@anl.gov)

### Education:

1994 Ph.D. University of Illinois at Chicago, Biological Sciences  
1979 M.S. University of Illinois Urbana-Champaign, Agronomy  
1973 B.S. University of Illinois Urbana-Champaign, Agricultural Science, Option in Conservation and Environmental Biology

### Professional Experience:

2010-present Senior Terrestrial Ecologist, Argonne National Laboratory  
2003-present Adjunct Faculty, Department of Geography, Northern Illinois University  
1995-2010 Terrestrial Ecologist, Argonne National Laboratory  
1984-1995 Environmental Scientist, Argonne National Laboratory  
1979-1984 Assistant Environmental Scientist, Argonne National Laboratory  
1975-1979 Scientific Assistant, Argonne National Laboratory  
1973-1975 Research Assistant, Agronomy Department, University of Illinois Urbana-Champaign

### Research Interests:

Plant-microbe-soil interactions; soil carbon and nutrient dynamics; distribution and quality of carbon stocks in permafrost-region soils; soil aggregate formation and stabilization; feedbacks between soil structure, organic matter, and biota; ecosystem impacts of rising atmospheric CO<sub>2</sub> and climatic change; soil biogeochemistry; soil carbon sequestration; sustainable bioenergy production; restoration ecology.

### Professional Activities:

Member, Vulnerability of Permafrost Carbon Research Coordination Network, 2011-present.  
Chair, Workshop on "Characterizing Soil Carbon in Permafrost Regions and Its Vulnerability to Climate Change", Argonne National Laboratory, 2011.  
Chair, Workshop on "Data Needs for Improving Model Representations of Soil Carbon Responses to Climate Change in Permafrost Regions", Argonne National Laboratory, 2011.  
Member, Scientific Steering Group, International Soil Carbon Network, 2008-present.  
Co-organizer, Session on "Toward Large-Scale Assessments of Soil Carbon Turnover and Vulnerability: Measures, Models, and Networks", American Geophysical Union Fall Meeting, 2008.  
Member, Location of Meetings Committee, American Society of Agronomy, Crop Science Society of America, Soil Science Society of America, 2006-2009.  
Member, Steering Committee, National Academy of Sciences, Frontiers in Soil Science Research Workshop, 2005-2009.  
President, Soil Ecology Society, 2004-2005.  
Consulting Editor, *Plant and Soil*, Kluwer Academic Publishers, 1998-2003.  
Co-organizer, Symposium on "Carbon Sequestration by Soils", Annual Meeting of the Soil Science Society of America, 1998.  
Consultant, The Field Museum of Natural History "Underground Adventure" Exhibit, 1997-1998.

### Honors/Awards:

Francis E. Clark Distinguished Lectureship on Soil Biology, Soil Science Society of America, 2010.  
Outstanding Mentor, U.S. Department of Energy, Office of Science, Pre-Service Teachers Program, 2009  
Outstanding Mentor, U.S. Department of Energy, Office of Science, Undergraduate Research Programs, 2003

**Publications:**

1. Stockmann, U., M.A. Adams, J.W. Crawford, D.J. Field, N. Henakaarchchi, M. Jenkins, B. Minasny, A.B. McBratney, V. de Remy de Courcelles, K. Singh, I. Wheeler, L. Abbott, D. Angers, J. Baldock, M. Bird, P.C. Brookes, C. Chenu, J.D. Jastrow, R. Lal, J. Lehmann, A.G. O'Donnell, W.J. Parton, D. Whitehead, and M. Zimmermann. The knowns, known unknowns and unknowns of sequestration of soil organic carbon. *Agriculture, Ecosystems and Environment* (in press).
2. O'Brien, S.L., J.D. Jastrow, K.J. McFarlane, T.P. Guilderson, and M.A. Gonzalez-Meler. Decadal cycling within long-lived carbon pools revealed by dual isotopic analysis of mineral-associated soil organic matter. *Biogeochemistry*, DOI 10.1007/s10533-011-9673-0 (in press).
3. O'Brien, S.L., J.D. Jastrow, K.J. McFarlane, T.P. Guilderson, and M.A. Gonzalez-Meler. Erratum to: Decadal cycling within long-lived carbon pools revealed by dual isotopic analysis of mineral-associated soil organic matter. *Biogeochemistry*, DOI 10.1007/s10533-012-9745-9 (in press).
4. Mayer, L.M., K.R. Thornton, L.L. Schick, J.D. Jastrow, and J.W. Harden. 2012. Photodissolution of soil organic matter. *Geoderma* 170:314-321.
5. Schuur, E.A.G., B.W. Abbott, and the Permafrost Carbon Network (W.B. Bowden, V. Brovkin, P. Camill, J.P. Canadell, F.S. Chapin III, T.R. Christensen, J.P. Chanton, P. Ciais, P.M. Crill, B.T. Crosby, C.I. Czimczik, G. Grosse, D.J. Hayes, G. Hugelius, J.D. Jastrow, T. Kleinen, C.D. Koven, G. Krinner, P. Kuhry, D.M. Lawrence, S.M. Natali, C.L. Ping, A. Rinke, W.J. Riley, V.E. Romanovsky, A.B.K. Sannel, C. Schädel, K. Schaefer, Z.M. Subin, C. Tarnocai, M. Turetsky, K. M. Walter-Anthony, C.J. Wilson, and S.A. Zimov). 2011. High risk of permafrost thaw. *Nature* 480:32-33.
6. Garten, Jr., C.T., D.J. Brice, H.F. Castro, R.L. Graham, M.A. Mayes, J.R. Phillips, W.M. Post III, C.W. Schadt, S.D. Wullschleger, D.D. Tyler, P.M. Jardine, J.D. Jastrow, R. Matamala, R.M. Miller, K.K. Moran, T.W. Vugteveen, R.C. Izaurralde, A.M. Thomson, T.O. West, J.E. Amonette, V.L. Bailey, F.B. Metting, and J.L. Smith. 2011. Response of "Alamo" switchgrass tissue chemistry and biomass to nitrogen fertilization in West Tennessee, USA. *Agriculture Ecosystems and Environment* 140:289-297.
7. Hofmockel, K.S., D.R. Zak, K.K. Moran, and J.D. Jastrow. 2011. Changes in forest soil organic matter pools after a decade of elevated CO<sub>2</sub> and O<sub>3</sub>. *Soil Biology and Biochemistry* 43:1518-1527.
8. Jung, J.Y., R. Lal, J.D. Jastrow, and D.D. Tyler. 2011. Nitrogenous fertilizer effects on soil structural properties under switchgrass. *Agriculture Ecosystems and Environment* 141:215-220.
9. Garten Jr., C.T., J.L. Smith, D.D. Tyler, J.E. Amonette, V.L. Bailey, D.J. Brice, H.F. Castro, R.L. Graham, C.A. Gunderson, R.C. Izaurralde, P.M. Jardine, J.D. Jastrow, M.K. Kerley, R. Matamala, M.A. Mayes, F.B. Metting, R.M. Miller, K.K. Moran, W.M. Post III, R.D. Sands, C.W. Schadt, J.R. Phillips, A.M. Thomson, T. Vugteveen, T.O. West, and S.D. Wullschleger. 2010. Intra-annual changes in biomass, carbon, and nitrogen dynamics at 4-year old switchgrass field trials in west Tennessee, USA. *Agriculture, Ecosystems and Environment* 136:177-184.
10. Moran, K.K., and J.D. Jastrow. 2010. Elevated carbon dioxide does not offset loss of soil carbon from a corn-soybean agroecosystem. *Environmental Pollution* 158:1088-1094.
11. O'Brien, S.L., J.D. Jastrow, D.A. Grimley, and M.A. Gonzalez-Meler. 2010. Moisture and vegetation controls on decadal-scale accrual of soil organic carbon and total nitrogen in restored grasslands. *Global Change Biology* 16:2573-2588.
12. Hungate, B.A., K.-J. van Groenigen, J. Six, J.D. Jastrow, Y.Q. Luo, M.-A. de Graaff, C. van Kessel, and C.W. Osenberg. 2009. Assessing the effect of elevated carbon dioxide on soil carbon: a comparison of four meta-analyses. *Global Change Biology* 15:2020-2034.
13. Post W.M., J.E. Amonette, R. Birdsey, C.T. Garten Jr., R.C. Izaurralde, P.M. Jardine, J. Jastrow, R. Lal, G. Marland, B.A. McCarl, A.M. Thomson, T.O. West, S.D. Wullschleger, and F.B. Metting. 2009. Terrestrial biological carbon sequestration: Science for enhancement and implementation, pp. 73-88. In B.J. McPherson and E.T. Sundquist (Eds.) *Carbon Sequestration and Its Role in the Global Carbon Cycle*. Geophysical Monograph Series 183, American Geophysical Union, Washington, DC.
14. Rice, C.W., P.M. Bertsch, J. Bouma, J. Harden, J.L. Hatfield, J.D. Jastrow, W.A. Jury, and J. Ruiz. 2009. *Frontiers in Soil Science Research: Report of a Workshop*. National Research Council, The National Academies Press, Washington DC. 80 pp.

15. Filley, T.R., T.W. Boutton, J.D. Liao, J.D. Jastrow, and D.E. Gamblin. 2008. Chemical changes to nonaggregated particulate soil organic matter following grassland-to-woodland transition in a subtropical savanna. *Journal of Geophysical Research—Biogeosciences* 113:G03009.
16. Fitzsimons, M.S., R.M. Miller, and J.D. Jastrow. 2008. Scale-dependent niche axes of arbuscular mycorrhizal fungi. *Oecologia* 158:117-127.
17. Matamala, R., J.D. Jastrow, R.M. Miller, and C.T. Garten. 2008. Temporal changes in C and N stocks of restored prairie: Implications for C sequestration strategies. *Ecological Applications* 18:1470-1488.
18. McCarthy, J.F., J. Ilavsky, J.D. Jastrow, L.M. Mayer, E. Perfect, and J. Zhuang. 2008. Protection of organic carbon in soil microaggregates via restructuring of aggregate porosity and filling of pores with accumulating organic matter. *Geochimica et Cosmochimica Acta* 72:4725-4744.
19. Zhuang, J., J.F. McCarthy, E. Perfect, L.M. Mayer, and J.D. Jastrow. 2008. Soil water hysteresis in water-stable microaggregates as affected by organic matter. *Soil Science Society of America Journal* 72:212-220.
20. Allison, V.J., Z. Yermakov, R.M. Miller, J.D. Jastrow, and R. Matamala. 2007. Assessing soil microbial community composition across landscapes: Do surface soils reveal patterns? *Soil Science Society of America Journal* 71:730-734.
21. Allison, V.J., Z. Yermakov, R.M. Miller, J.D. Jastrow, and R. Matamala. 2007. Using landscape and depth gradients to decouple the impact of correlated environmental variables on soil microbial community composition. *Soil Biology and Biochemistry* 39:505-516.
22. Jastrow, J.D., J.E. Amonette, and V.L. Bailey. 2007. Mechanisms controlling soil carbon turnover and their potential application for enhancing carbon sequestration. *Climatic Change* 80:5-23.
23. Allison, S.D., and J.D. Jastrow. 2006. Activities of extracellular enzymes in physically isolated fractions of restored grassland soils. *Soil Biology and Biochemistry* 38:3245-3256.
24. Liao, J.D., T.W. Boutton, and J.D. Jastrow. 2006. Storage and dynamics of carbon and nitrogen in soil physical fractions following woody plant invasion of grassland. *Soil Biology and Biochemistry* 38:3184-3196.
25. Liao, J.D., T.W. Boutton, and J.D. Jastrow. 2006. Organic matter turnover in soil physical fractions following woody plant invasion of grassland: Evidence from natural <sup>13</sup>C and <sup>15</sup>N. *Soil Biology and Biochemistry* 38:3197-3210.
26. Norby, R.J., S.D. Wullschleger, P.J. Hanson, C.A. Gunderson, T.J. Tschaplinski, and J.D. Jastrow. 2006. CO<sub>2</sub> enrichment of a deciduous forest: The Oak Ridge FACE experiment, pp. 231-251. In J. Nösberger, S.P. Long, R.J. Norby, M. Stitt, G.R. Hendrey, and H. Blum (eds.) *Managed Ecosystems and CO<sub>2</sub> Case Studies, Processes, and Perspectives*. Ecological Studies, Vol. 187, Springer-Verlag, Berlin.
27. Allison, V.J., R.M. Miller, J.D. Jastrow, R. Matamala, and D.R. Zak. 2005. Changes in soil microbial community structure in a tallgrass prairie chronosequence. *Soil Science Society of America Journal* 69:1412-1421.
28. Jastrow, J.D., R.M. Miller, R. Matamala, R.J. Norby, T.W. Boutton, C.W. Rice, and C.E. Owensby. 2005. Elevated atmospheric CO<sub>2</sub> increases soil carbon. *Global Change Biology* 11:2057-2064.
29. Matamala, R., M.A. Gonzalez-Meler, J.D. Jastrow, R.J. Norby, and W.H. Schlesinger. 2004. Response to comment on "Impacts of fine root turnover on forest NPP and soil C sequestration potential". *Science* 304:1745.
30. Post, W.M., R.C. Izaurralde, J.D. Jastrow, B.A. McCarl, J.E. Amonette, V.L. Bailey, P.M. Jardine, and J. Zhou. 2004. Enhancement of carbon sequestration in U.S. soils. *BioScience* 54:895-908.
31. Bever, J.D., P.A. Schultz, R.M. Miller, L. Gades, and J.D. Jastrow. 2003. Inoculation with prairie mycorrhizal fungi may improve restoration of native prairie plant diversity. *Ecological Restoration* 21:311-312.
32. Matamala, R., M.A. Gonzalez-Meler, J.D. Jastrow, R.J. Norby, and W.H. Schlesinger. 2003. Impacts of fine root turnover on forest NPP and soil C sequestration potential. *Science* 302:1385-1387.

33. Miller, R.M., S.P. Miller, J.D. Jastrow, and C.B. Rivetta. 2002. Mycorrhizal mediated feedbacks influence net carbon gain and nutrient uptake in *Andropogon gerardii*. *New Phytologist* 155:149-162.
34. Six, J., and J.D. Jastrow. 2002. Organic matter turnover, pp.936-942. In R. Lal (ed.), *Encyclopedia of Soil Science*. Marcel Dekker, New York. (also published online at [www.dekker.com](http://www.dekker.com))
35. Schultz, P.A., R.M. Miller, C.B. Rivetta, J.D. Jastrow, and J.D. Bever. 2001. Evidence of a mycorrhizal mechanism for the adaptation of *Andropogon gerardii* to high and low-nutrient prairies. *American Journal of Botany* 88:1650-1656.
36. Jastrow, J.D., R.M. Miller, and C.E. Owensby. 2000. Long-term effects of elevated atmospheric CO<sub>2</sub> on below-ground biomass and transformations to soil organic matter in grassland. *Plant and Soil* 224:85-97.
37. Miller, R.M., and J.D. Jastrow. 2000. Mycorrhizal fungi influence soil structure, pp. 3-18. In Y. Kapulnik and D.D. Douds, Jr. (eds.), *Arbuscular Mycorrhizas: Physiology and Function*. Kluwer Academic Publishers, Dordrecht, The Netherlands.
38. Jacobs, G.K., G.R. Hendrey, ... J.D. Jastrow, et al. 1999. Carbon sequestration in terrestrial ecosystems, pp. 4-1 through 4-29. In *Carbon Sequestration, Research and Development*. Office of Science, Office of Fossil Energy, U.S. Department of Energy. DOE/SC/FE-1.
39. Jastrow, J.D. 1999. Working Group 2: Monitoring and verification, pp. 183-186. In N.J. Rosenberg, R.C. Izaurralde, and E.L. Malone (eds.) *Carbon Sequestration in Soils: Science, Monitoring and Beyond*. Proceedings of the St. Michaels Workshop, 3-5 December 1998. Battelle Press, Columbus, OH.
40. Kemner, K.M., W. Yun, Z. Cai, B. Lai, H.-R. Lee, J. Maser, D.G. Legnini, W. Rodrigues, J.D. Jastrow, R.M. Miller, S.T. Pratt, M.A. Schneegurt, and C.F. Kolpa Jr. 1999. Using zone plates for X-ray microimaging and microspectroscopy in environmental science. *Journal of Synchrotron Radiation* 6:639-641.
41. Miller, R.M., C.I. Smith, J.D. Jastrow, and J.D. Bever. 1999. Mycorrhizal status of the genus *Carex* (Cyperaceae). *American Journal of Botany* 86:547-553.
42. Six, J., P.A. Schultz, J.D. Jastrow, and R. Merckx. 1999. Recycling of sodium polytungstate used in soil organic matter studies. *Soil Biology and Biochemistry* 31:1193-1196.
43. Jastrow, J.D., and R.M. Miller. 1998. Soil aggregate stabilization and carbon sequestration: Feedbacks through organomineral associations, pp. 207-223. In R. Lal, J.M. Kimble, R.F. Follett, and B.A. Stewart (eds.), *Soil Processes and the Carbon Cycle*. CRC Press LLC, Boca Raton, FL.
44. Jastrow, J.D., R.M. Miller, and J. Lussenhop. 1998. Contributions of interacting biological mechanisms to soil aggregate stabilization in restored prairie. *Soil Biology and Biochemistry* 30:905-916.
45. Kemner, K.M., W. Yun, Z. Cai, B. Lai, H.-R. Lee, D.G. Legnini, W. Rodrigues, J.D. Jastrow, R.M. Miller, S.T. Pratt, M.A. Schneegurt, C.F. Kolpa Jr., and A.J.M. Smucker. 1998. Using X-ray microprobes for environmental research. *X-Ray Microfocusing: Applications and Techniques*, SPIE Proceedings Series 3449:45-54.
46. Miller, R.M., and J.D. Jastrow. 1998. Extraction and quantification of external mycorrhizal hyphae, pp. 10-15. In M. Kling (ed.) *Development and Function of the Mycelium of Arbuscular Mycorrhizal Fungi*, Second International Conference on Mycorrhizae Pre-conference Workshop Method Manual, Uppsala, Sweden, 1-4 July 1998. Department of Microbiology, Swedish University of Agricultural Sciences, Uppsala, Sweden.
47. Jastrow, J.D. 1996. Soil aggregate formation and the accrual of particulate and mineral-associated organic matter. *Soil Biology and Biochemistry* 28:665-676.
48. Jastrow, J.D., T.W. Boutton, and R.M. Miller. 1996. Carbon dynamics of aggregate-associated organic matter estimated by carbon-13 natural abundance. *Soil Science Society of America Journal* 60:801-807.
49. McConnell, J.W., Jr., R.D. Rogers, T.M. Sullivan, J.D. Jastrow, D.S. Hicks, and R.R. Brey. 1996. Lysimeter data as input to performance assessment models, pp. 706-723. In T.M. Gilliam and C.C. Wiles (eds.), *Stabilization and Solidification of Hazardous, Radioactive, and Mixed Wastes*, 3rd

- Volume, ASTM STP 1240. American Society for Testing and Materials, West Conshohocken, Pennsylvania.
50. Miller, R.M., and J.D. Jastrow. 1996. Contributions of legumes to the formation and maintenance of soil structure. pp. 105-112. *In* D. Younie (ed.), *Legumes in Sustainable Farming Systems*. Occasional Symposium No. 30, British Grassland Society, Reading, UK.
  51. Miller, R.M., D.R. Reinhardt, and J.D. Jastrow. 1995. External hyphal production of vesicular-arbuscular mycorrhizal fungi in pasture and tallgrass prairie communities. *Oecologia* 103:17-23.
  52. Brey, R.R., J.W. McConnell, R.D. Rogers, T.M. Sullivan, and J.D. Jastrow. 1994. A preliminary investigation of the existence of radiocolloids in leachate from the NRC field lysimeter investigations. *Waste Management* 14:581-588.
  53. Miller, R.M., and J.D. Jastrow. 1994. Vesicular-arbuscular mycorrhizae and biogeochemical cycling, pp. 189-212. *In* F.L. Pfleger and R.G. Linderman (eds.), *Mycorrhizae and Plant Health*. APS Press, The American Phytopathology Society, St. Paul, Minnesota.
  54. Jastrow, J.D., and R.M. Miller. 1993. Neighbor influences on root morphology and mycorrhizal fungus colonization in tallgrass prairie plants. *Ecology* 74:561-569.
  55. Rogers, R.D., J.W. McConnell, Jr., T.M. Sullivan, J.D. Jastrow, and D.S. Hicks. 1993. Field testing of waste forms using lysimeters: Results after seven years, pp. 459-465. *In* M. Arnould, M. Barrès, and B. Côme (eds.), *Geology and Confinement of Toxic Wastes*. A.A. Balkema, Rotterdam.
  56. McConnell, J.W., Jr., R.D. Rogers, J.D. Jastrow, and D.S. Wickliff. 1992. Results of field testing of radioactive waste forms using lysimeters, pp. 1455-1462. *In* Proceedings of *Spectrum '92: Nuclear and Hazardous Waste Management International Topical Meeting*, Boise, Idaho, 23-27 August 1992. American Nuclear Society.
  57. Miller, R.M., and J.D. Jastrow. 1992. Extraradical hyphal development of vesicular-arbuscular mycorrhizal fungi in a chronosequence of prairie restorations, pp. 171-176. *In* D.J. Read, D.H. Lewis, A.H. Fitter, and I.J. Alexander (eds.), *Mycorrhizas in Ecosystems*. CAB International, Cambridge, United Kingdom.
  58. Miller, R.M., and J.D. Jastrow. 1992. The application of va mycorrhizae to ecosystem restoration and reclamation, pp. 438-467. *In* M.F. Allen (ed.), *Mycorrhizal Functioning: An Integrative Plant-Fungal Process*. Chapman and Hall, New York.
  59. Miller, R.M., and J.D. Jastrow. 1992. The role of mycorrhizal fungi in soil conservation, pp. 29-44. *In* G.J. Bethlenfalvay and R.G. Linderman (eds.), *Mycorrhizae in Sustainable Agriculture*. ASA Special Publication No. 54, American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America, Madison, Wisconsin.
  60. Rogers, R.D., J.W. McConnell, Jr., J.D. Jastrow, and D.S. Wickliff. 1992. Contributions of lysimeter data to the development of site specific performance assessment plans, pp. 448-465. *In* T.M. Gilliam and C.C. Wiles (eds.), *Stabilization and Solidification of Hazardous, Radioactive, and Mixed Wastes*, 2nd Volume. American Society for Testing and Materials, Philadelphia, Pennsylvania.
  61. Jastrow, J.D., and R.M. Miller. 1991. Methods for assessing the effects of biota on soil structure. *Agriculture, Ecosystems and Environment* 34:279-303.
  62. Jastrow, J.D., and R.M. Miller. 1991. Methods for assessing the effects of biota on soil structure, pp. 279-303. *In* D.A. Crossley, Jr., D.C. Coleman, P.F. Hendrix, W. Cheng, D.H. Wright, M.H. Beare, and C.A. Edwards (eds.), *Modern Techniques in Soil Ecology*. Elsevier Science Publishers, Amsterdam.
  63. Rogers, R.D., J.W. McConnell, Jr., J.D. Jastrow, and D.S. Wickliff. 1991. Results of field testing of waste forms using lysimeters, pp. 85-91. *In* Proceedings of the *1991 Joint International Waste Management Conference, Volume 1: Low and Intermediate Level Radioactive Waste Management*, Seoul, Korea, 21-26 October 1991. American Society of Mechanical Engineers.
  64. Miller, R.M., and J.D. Jastrow. 1990. Hierarchy of root and mycorrhizal fungal interactions with soil aggregation. *Soil Biology and Biochemistry* 22:579-584.
  65. Wesely, M.L., D.L. Sisterson, and J.D. Jastrow. 1990. Observations of the chemical properties of dew on vegetation that affect the dry deposition of SO<sub>2</sub>. *Journal of Geophysical Research* 95:7501-7514.

66. Cook, B.D., J.D. Jastrow, and R.M. Miller. 1988. Root and mycorrhizal endophyte development in a chronosequence of restored tallgrass prairie. *New Phytologist* 110:355-362.
67. Jastrow, J.D. 1987. Changes in soil aggregation associated with tallgrass prairie restoration. *American Journal of Botany* 74:1656-1664.
68. Miller, R.M., and J.D. Jastrow. 1986. Influence of soil structure supports agricultural role for prairies, prairie restoration. *Restoration & Management Notes* 4:62-63.
69. Jastrow, J.D., R.M. Miller, S.C. Rabatin, and R.R. Hinchman. 1984. Revegetation of disturbed lands in arid ecosystems, pp. 2-1 through 2-36. In A.J. Dvorak (ed.), *Ecological Studies of Disturbed Landscapes*. DOE/NBM-5009372, U.S. Department of Energy.
70. Jastrow, J.D., et al. 1984. Amelioration of acidic waste materials resulting from energy mineral extraction, pp. 4-1 through 4-67. In A.J. Dvorak (ed.), *Ecological Studies of Disturbed Landscapes*. DOE/NBM-5009372, U.S. Department of Energy.
71. Jastrow, J.D., A.J. Dvorak, M.J. Knight, and B.K. Mueller. 1981. *Revegetation of Acidic Coal Refuse: Effects of Soil Cover Material Depth and Liming Rate on Initial Establishment*. ANL/LRP-17, Argonne National Laboratory. 80 pp.
72. Jastrow, J.D., C.A. Zimmerman, A.J. Dvorak, and R.R. Hinchman. 1981. Plant growth and trace-element uptake on acidic coal refuse amended with lime or fly ash. *Journal of Environmental Quality* 10:154-160.
73. Jastrow, J.D., and D.E. Koeppel. 1980. Uptake and effects of cadmium in higher plants, pp. 607-638. In J.O. Nriagu (ed.), *Cadmium in the Environment, Part I*. John Wiley and Sons, New York.