

CURRICULUM VITA

James Walworth

RESEARCH INTERESTS

My research program is focused on nutrient management in soils with the goals of optimizing productivity and minimizing adverse environmental impacts. Agricultural and horticultural applications include nutrient management for pecans and turf grass in desert environments, water and salinity management in pecan, turf grass, and vegetable production and urban landscaping, and evaluation of nutrients from animal manures. Non-agricultural research is directed towards nitrogen use in bioremediation of petroleum-contaminated soils, with a focus on cold-region (primarily sub-Antarctic and Antarctic) soils.

EDUCATION

Ph.D. 1985, Agronomy, University of Georgia.

Dissertation title: "The Development of Diagnostic and Foliar Norms for Alfalfa"

Advisor: Dr. Malcolm Sumner

M.S. 1980, Soil Science, University of Wisconsin – Madison

Thesis title: "Xanthates as Nitrification Inhibitors and Urea Coatings"

Advisor: Dr. John Harkin

B.S. 1976, Soil Science, University of Wisconsin - Madison

WORK EXPERIENCE

5/07 - present: Professor and Specialist, Department of Soil, Water and Environmental Science, University of Arizona

6/00 - 5/07: **Associate Professor and Specialist**, Department of Soil, Water and Environmental Science, University of Arizona

4/98 - 6/00: **Associate Specialist**, Department of Soil, Water and Environmental Science, University of Arizona

6/93 - 4/98: **Associate Professor of Soil Science**, Department of Plant, Animal and Soil Sciences, University of Alaska Fairbanks

2/89 - 6/93: **Assistant Professor of Soil Science**, Department of Plant, Animal and Soil Sciences, University of Alaska Fairbanks

8/85 - 2/89: **Assistant Professor of Soil Science**, Soils and Crops Department, Rutgers University

10/84 - 8/85: **Research Associate**, Agronomy Department, University of Georgia

1/82 - 9/84: **Graduate Teaching Assistant**, Agronomy Department, University of Georgia

4/79 - 12/81: **Assistant Superintendent**, Hancock Experiment Station, University of Wisconsin - Madison

1/77 - 4/79: **Graduate Research Assistant**, Department of Soil Science, University of Wisconsin - Madison

CURRENT TEACHING

Fundamentals of Soil Science, SWES 200, Soil, Water and Environmental Science, University of Arizona

Soil Fertility, SWES 316, Soil, Water and Environmental Science, University of Arizona

Careers in Environmental Science, UNVR 195a, Soil, Water and Environmental Science, University of Arizona

PUBLICATONS

Refereed Journal Articles

J.L. Rayner, I. Snape, J.L. Walworth, P.M. Harvey and S.H. Ferguson. 2007. Petroleum Hydrocarbon Contamination and Remediation by Microbioventing at Sub-antarctic Macquarie Island. *Cold Regions Science and Technology* 48(2): 139-153.

J.P. Field, K.L. Farrell-Poe, and J.L. Walworth. 2007. Comparative Treatment Effectiveness of Conventional Trench and Seepage Pit Systems. *Water Environment Research* 79(3): 310-319.

D.M. Kopec, J.L. Walworth, J.J. Gilbert, G.M. Sower, and M. Pessarakli. 2007. Response of Sea Isle 2000 Paspalum to Mowing Height and Nitrogen Fertility as a Putting Surface under Semi-Arid Conditions. *Agronomy Journal* 99: 133-140.

J.L. Walworth, A.P. Pond, I. Snape, J.L. Rayner, and P.M. Harvey. 2007. Fine Tuning Soil Nitrogen to Maximize Petroleum Bioremediation in Contaminated Soil from Macquarie Island. *Cold Regions Science and Technology* 48(2): 84-91.

C. Walecka-Hutchison and J.L. Walworth. 2007. Evaluating the Effects of Gross Nitrogen Mineralization, Immobilization and Nitrification on Nitrogen Fertilizer Availability during Diesel Biodegradation. *Biodegradation* 18: 133-144.

A.P. Pond, J.L. Walworth, M.W. Kilby, R.D. Gibson, and R.E. Call. 2006. Leaf Nutrient Levels for Pecan in Southern Arizona. *HortScience* 41(5):1339-1341.

C. Walecka-Hutchison and J.L. Walworth. 2006. Assessment of C:N Ratios and Water Potential for Nutrient Optimization in Diesel Bioremediation.. *Bioremediation Journal* 10(1-2): 1-11.

A. Kusakabe, S.A. White, J. L. Walworth, G. C. Wright, and T. L. Thompson. 2006. Response of Microsprinkler-Irrigated Navel Oranges to Fertigated Nitrogen Rate and Frequency. *Soil Science Society of America Journal* 70(7):1623-1628.

J.L. Walworth, A.P. Pond, G.J. Sower, and M.W. Kilby. 2006. Fall-Applied Foliar Zinc for Pecans in the Desert Southwest. *HortScience* 41(1):275-276.

J.L. Walworth and A.P. Pond. 2006. Zinc Nutrition of Pecans Growing in Alkaline Soils. *Pecan South* 39(5):14-22.

M.M. Pessaraki and J.L. Walworth. 2005. Growth Responses of Zoysiagrass Influenced by Different Rates of a Growth Stimulant (Soil Solution One). *Journal of Food, Agriculture and Environment*. 2(3&4):287-288.

X. Jia, D.S. Larson, D.C. Slack, and J.L. Walworth. 2005. Electrokinetic Control of Nitrate Movement in Soil. *Journal of Engineering Geology*. 77:273-283.

J.L. Walworth, C.R. Woolard, and K.C. Harris. 2003. Nutrient Amendments For Contaminated Peri-Glacial Soils: Use Of An Organic Controlled Release Nutrient Source. *Cold Regions Science and Technology*. 37:81-88.

S. Rawahy, D.S.Larson, J.L. Walworth, and D.C. Slack. 2003. Effect of an Electrical Input with Drip Irrigation on Nitrate Distribution in Soil. *Applied Engineering in Agriculture*. 19(1):55-58.

T.L. Thompson, J.L. Walworth, S. White, and G. Sower. 2003. Fertigation Frequency in Subsurface Drip Irrigated Broccoli. *Soil Science Society of America Journal*. 67:910-918.

J.L. Walworth and D.E. Carling. 2002. Tuber Initiation and Development in Irrigated and Non-irrigated Potatoes. *American Journal of Potato Research*. 19:1-9.

C. Walecka-Hutchison and J.L. Walworth. 2001. Hydrocarbon Biodegradation Rates and Water Potential in Nitrogen Augmented Desert Soils. In-Situ and On-Site Bioremediation. *Symposium: Bioremediation of Inorganic Compounds*. 6(9):231-239.

J.L. Walworth, J.F. Braddock, and C.R. Woolard. 2001. Nutrient and Temperature Interactions in Bioremediation of Cryic Soils. *Cold Regions Science and Technology*. *Cold Regions Science and Technology*, 32 (2-3):85-91.

M.W. Vandersande, E.P. Glenn, and J.L. Walworth. 2000. Comparative Tolerances of Five Riparian Plants From The Lower Colorado River to Salinity Drought And Inundation. *Journal of Arid Environments*, 49(1):147-159.

C.R. Woolard, D.M. White, J.L. Walworth, and M.E. Hannah. 1999. The Magnitude and Variability of Biogenic Interference in Cold Regions Soils. *Journal of Cold Regions Engineering* 13(3)113-121.

J.L. Walworth, C.R. Woolard, L. Acomb, and M. Wallace. 1999. Nutrient and Temperature Interactions in Bioremediation of Petroleum-Contaminated Cryic Soil. In-Situ and On-Site Bioremediation 5(3):505-510.

C.R. Woolard, D.M. White, J.L. Walworth, and M. Hannah. 1999. Biogenic Interference with Petroleum Analysis in Organic Soils from Alaska. *In-Situ and On-Site Bioremediation* 5(3):523-527.

J.F. Braddock, J.L. Walworth, and K.A. McCarthy. 1999. Biodegradation of Aliphatic vs. Aromatic Hydrocarbons in Fertilized Arctic Soils. *Bioremediation J.* 3(2):105-116.

J.L. Walworth, C.R. Woolard, J.F. Braddock, and C.M. Reynolds. 1997. Enhancement and Inhibition of Soil Petroleum Biodegradation Through the Use of Fertilizer Nitrogen: An Approach to Determining Optimum Levels. *J. Soil Contamination* 6(5):465-480.

J.F. Braddock, M.L. Ruth, P.H. Catterall, J.L. Walworth, and K.A. McCarthy. 1997. Enhancement and Inhibition of Microbial Activity in Hydrocarbon-Contaminated Arctic Soils: Implications for Nutrient-Amended Bioremediation. *Environ. Sci. Tech.* 31:2078-2084.

Reynolds, B.A. Koenen, J.B. Carnahan, J.L. Walworth, and P. Bhunia. 1997. Rhizosphere and Nutrient Effects on Remediating Subarctic Soils. *In Situ and On-Site Bioremediation* 4(1):297-302.

J.L. Walworth, C.R. Woolard, and K.C. Harris. 1997. Bioremediation of Petroleum-Contaminated Soil Using Fish Bonemeal in Cold Climates. *Agroborealis* 29(1): 31-34.

E.H. Willson, E.V. Hogan, C.R. Woolard, and J.L. Walworth. 1997. Nitrous Oxide Consumption in Contaminated Soil. *In Situ and On-Site Bioremediation* 4(1):397-401.

J.L. Walworth, C.R. Woolard, J.F. Braddock, and C.M. Reynolds. 1997. The Role of Soil Nitrogen Concentration in Bioremediation. *In Situ and On-Site Bioremediation* 4(4):283-288.

C.M. Reynolds, C.A. Beyrouy, D.C. Wolf, and J.L. Walworth. 1995. Rhizosphere Enhanced Bioremediation for Cold Regions: Contaminant Effects on Root Distribution. *Proceedings of a Joint US/Canada Military and Civilian Workshop, Technologies and Techniques for Hydrocarbon Remediation in Cold and Arctic Climates, June 6-7, 1995, Royal Military College, Kingston, Ontario.*

J.L. Walworth and C.M. Reynolds. 1995. Remediation of a Petroleum Contaminated Cryic Soil: Effects of Phosphorus, Nitrogen, and Temperature. *J. Soil Contamination* 4: 299-310.

R.G. Gavlak, W.L. Campbell, J.L. Walworth, C.L. Johnson, J.E. Muniz, and T.A. Tindall. Nitrogen Fertilization of Irrigated Russet Potatoes in Southcentral Alaska. *American Potato Journal* 70: 571-578.

J.L. Walworth and J.E. Muniz. A Compendium of Tissue Nutrient Concentrations for Field-Grown Potatoes. *American Potato Journal* 70: 579-597.

J.L. Walworth, R.G. Gavlak, and M.T. Panciera. 1992. Mehlich 3 Extractant for Determination of Available B, Cu, Fe, Mn, and Zn in Cryic Alaskan Soils. *Canadian Journal of Soil Science* 72: 517-526.

J.L. Walworth. 1992. Soil Drying and Rewetting, or Freezing and Thawing, Affects Soil Solution Composition. *Soil Science Society of America Journal* 56:433-437.

J.L. Walworth, D.E. Carling, and G.J. Michaelson. 1992. Nitrogen Sources and Rates for Direct-Seeded and Transplanted Head Lettuce. *HortScience* 27:228-230.

J.L. Walworth and S. Ceccotti. 1990. A Re-examination of Optimum Foliar Magnesium Levels in Corn. *Communications in Soil Science and Plant Analysis* 21:1457-1473.

J.L. Walworth and M.E. Sumner. 1990. Alfalfa Response to Lime, Phosphorus, Potassium, Magnesium, and Molybdenum on Acid Ultisols. *Fertilizer Research* 24:167-172.

J.L. Walworth, H.J. Woodard, and M.E. Sumner. 1988. Generation of Corn Tissue Norms from a Small, High-Yield Data Base. *Communications in Soil Science and Plant Analysis* 19:563-577.

W.B. Hallmark, J.L. Walworth, M.E. Sumner, C.J. deMooy, J. Pesek, and K.P. Shao. 1987. Separating Limiting from Non-Limiting Nutrients. *Journal of Plant Nutrition* 10:1381-1390.

J.L. Walworth, M.E. Sumner, and W.S. Letzsch. 1986. Effectiveness of Topdressed Phosphorus Applied to Established Alfalfa. *Proceedings of the 1986 Forage and Grassland Conference* pp. 235-240.

J.L. Walworth, W.S. Letzsch, and M.E. Sumner. 1986. Use of Boundary Lines in Establishing Diagnostic Norms. *Soil Science Society of America Journal* 50:123-128.

J.L. Walworth, M.E. Sumner, R.A. Isaac, and C.O. Plank. 1986. Preliminary DRIS Norms for Alfalfa in the Southeastern United States and a Comparison with Midwestern Norms. *Agronomy Journal* 78:1046-1052.

Chapters in Scholarly Books

I. Snape, C.M. Reynolds, J.L. Walworth, and S.H. Ferguson. 2007. Treatability studies: Microcosms, Mesocosms and Field Trials. In: D.M. Filler, D.L., Barnes, and I. Snape (Eds.). *Bioremediation of Petroleum Hydrocarbons in Cold Regions – A Handbook*. In press.

I. Snape, L. Acomb, D.L. Barnes, S. Bainbridge, R. Eno, D.M. Filler, N. Plato, J.S. Poland, T.C. Raymond, J.L. Rayner, M.J. Riddle, A.G. Rike, A. Rutter, A.N. Schafer, S.D. Siciliano, and J.L. Walworth. 2007. Contamination, Regulation and Remediation: an Introduction to Bioremediation of Petroleum Hydrocarbons in Cold Regions. In: D.M. Filler, D.L., Barnes, and I. Snape (Eds.). *Bioremediation of Petroleum Hydrocarbons in Cold Regions – A Handbook*. In press.

J.L. Walworth and S. Ferguson. 2007. Nutritional Requirements for Bioremediation. In: D.M. Filler, D.L., Barnes, and I. Snape (Eds.). *Bioremediation of Petroleum Hydrocarbons in Cold Regions – A Handbook*. In press.

J.L. Walworth, C.M. Reynolds, I. Snape, and A. Rutter. 2007. Land-Farming. In: D.M. Filler, D.L., Barnes, and I. Snape (Eds.). *Bioremediation of Petroleum Hydrocarbons in Cold Regions – A Handbook*. In press.

J.F. Artiola, J.L. Walworth, S. Musil, and C. Rasmussen. 2006. Soil and Land Pollution Sources. pp. 243-258. In I.L. Pepper, C.P. Gerba, and M.L. Brusseau (Eds.). *Environmental and Pollution Science*, 2nd Edition. Academic Press, Inc., San Diego, CA.

J.L. Walworth and I.L. Pepper. 2006. Physical Contaminants. pp. 123-131. In I.L. Pepper, C.P. Gerba, and M.L. Brusseau (Eds.). *Environmental and Pollution Science*, 2nd Edition. Academic Press, Inc., San Diego, CA.

C. Walecka-Hutchison and J.L. Walworth. 2005. Quantification of *In Situ* Trichloroethane versus Biodegradation Using a Novel Chloride Concentration Method. pp. 317-328. In E. Lichtfouse, J. Schwarzbauer, and D. Robert (Eds.), *Environmental Chemistry - Green Chemistry and Pollutants in Ecosystems*. Springer, Berlin.

J.L. Walworth. 2004. Physical Contaminants. pp. 281-297. In J. Artiola, M. Brusseau, and I. Pepper (Eds.) *Environmental Monitoring and Remediation*. Elsevier Academic Press, Burlington, MA.

J.L. Walworth and M.E. Sumner. 1988. Foliar Diagnosis - A Review. p. 193-241. In B.P. Tinker (ed.) *Advances in Plant Nutrition*, Vol. III. Praeger Publishing, New York, NY.

J.L. Walworth and M.E. Sumner. 1987. The Diagnosis and Recommendation Integrated System (DRIS). p. 149-188. In B.A. Stewart (ed.) *Advances in Soil Science*, Vol. VI. Springer-Verlag, New York, NY.

Extension and Popular Press Publications

J.L. Walworth. 2006. Soil Structure: The Roles of Sodium and Salts. The University of Arizona Cooperative Extension Publication AZ1414, University of Arizona, Tucson, AZ. <http://cals.arizona.edu/pubs/crops/az1414.ppt>

J.L. Walworth, A.P. Pond, and M.W. Kilby. 2006. Leaf Sampling Guide with Interpretation for Arizona Pecan Orchards. The University of Arizona Cooperative Extension Publication AZ1410, University of Arizona, Tucson, AZ. <http://cals.arizona.edu/pubs/diseases/az1410.pdf>

J.L. Walworth. 2006. Using Gypsum in Southwestern Soils. The University of Arizona Cooperative Extension Publication AZ1413, University of Arizona, Tucson, AZ. <http://cals.arizona.edu/pubs/garden/az1413.pdf>

J.L. Walworth. 2006. Soil Sampling and Analysis. The University of Arizona Cooperative Extension Publication AZ1412, University of Arizona, Tucson, AZ. <http://cals.arizona.edu/pubs/crops/az1412.pdf>

J.L. Walworth. 2006. Recognizing and Treating Iron Deficiency in the Home Yard. The University of Arizona Cooperative Extension Publication AZ1415, University of Arizona, Tucson, AZ. <http://cals.arizona.edu/pubs/garden/az1415.pdf>

T.L. Thompson and J.L. Walworth. 2006. Salinity Management and Soil Amendments for Southwestern Pecan Orchards. University of Arizona Cooperative Extension Publication AZ1411, University of Arizona, Tucson, AZ. <http://cals.arizona.edu/pubs/diseases/az1411.pdf>

D.M. Kopec, J.L., Walworth, J.J. Gilbert, G. Sower, and M. Pessaraki. 2005. Ball Roll Distance of Sea Isle 2000 in Response to Mowing and Fertility. USGA Turfgrass and Environmental Research Online 4(7):1-6. <http://usgatero.msu.edu/v04/n07.pdf>

D.M. Kopec, J.L. Walworth, J.J. Gilbert, G.M. Sower, and M. Pessaraki. 2005. Sea Isle 2000 on Desert Greens. Mowing Height and Nitrogen Fertility. Golf Course Management. Research Section. November 2005, pp. 84-87.

D.M. Kopec, J.J. Gilbert, J.L. Walworth, M. Pessaraki, D. Kerr, and J. Spence. 2005. Effects of Surface Cultural Practices on Sea Isle 2000 Greens. Golf Course Management. Research Section. December 2005, pp. 81-84.

A.P. Pond and J.L. Walworth. 2005. Pecan Leaf Tissue Interpretations. [http://ag.arizona.edu/swes/soil_fertility/Publications/Pecan Leaf Tissue Interpretations V1.1.xls](http://ag.arizona.edu/swes/soil_fertility/Publications/Pecan_Leaf_Tissue_Interpretations_V1.1.xls)

D.M. Kopec, J.L. Walworth, J.J., Gilbert, G. Sower, M. Pessaraki, D. Kerr and J. Spence. 2004. Response of Sea Isle I Paspalum To Fertilization and Mowing for Tee and Fairway Turf. 2004 Turfgrass Landscape and Urban IPM Research Summary. AZ 1359 Series P-141. University of Arizona, Tucson, AZ. <http://cals.arizona.edu/pubs/crops/az1359/az13593c10.pdf>

D.M. Kopec, J.J. Gilbert, J.L. Walworth, M.Pessaraki, D. Kerr, and J. Spence. 2004. Best Management Practices for Sea Isle 2000 Surface Conditions as a Putting Green Turf Under Desert Conditions. 2004 Turfgrass Landscape and Urban IPM Research Summary. AZ 1359 Series P-141. University of Arizona, Tucson, AZ. <http://cals.arizona.edu/pubs/crops/az1359/az13593c6.pdf>

Kopec, D.M., J.L. Walworth, J.J. Gilbert, G.M. Sower and M.Pessaraki. 2004. Response of Sea Isle 2000 Paspalum to Mowing Height and Nitrogen Fertility as a Putting Surface Under Semi-Arid Conditions. Two Year Report. 2004 Turfgrass Landscape and Urban IPM Research Summary. AZ 1359 Series P-141. University of Arizona, Tucson, AZ. <http://cals.arizona.edu/pubs/crops/az1359/az13593c9.pdf>

J.L. Walworth and D. Kopec. 2004. Response and Nutrient Uptake in Bermudagrass Treated with Aquatrols Surfactant ACA 1848 in the Desert Southwest. 2004 Turfgrass Landscape and Urban IPM Research Summary. AZ 1359 Series P-141. University of Arizona, Tucson, AZ. <http://cals.arizona.edu/pubs/crops/az1359/az13593c2.pdf>

J.L. Walworth and D.M. Kopec. 2004. Aquatrols Surfactant Study on Turfgrass Nutrient Uptake. 2004 Turfgrass Landscape and Urban IPM Research Summary. AZ 1359 Series P-141. University of Arizona, Tucson, AZ. <http://cals.arizona.edu/pubs/crops/az1359/az13593c5.pdf>

T.L. Thompson, S.A. White, J.L. Walworth. 2003. Development of Best Management Practices for Fertigation of Young Citrus Trees. 2003 Citrus Research Report. University of Arizona, Tucson, AZ <http://ag.arizona.edu/pubs/crops/az1331/az1331-8.pdf>

J.P. Field and J.L. Walworth. 2003. Impacts of Biosolids on Agricultural Lands. Pima Natural Resource Conservation District Newsletter.

J.P. Field and J.L. Walworth. 2003. Guidelines for the Application of Biosolids to Agricultural Lands. Pima Natural Resource Conservation District Newsletter.

J.P. Field and J.L. Walworth. 2003. Beneficial Effects of Biosolids on Soil Properties. Pima Natural Resource Conservation District Newsletter

J.L. Walworth and M. Kilby. 2002. Pecan Leaf Tissue Nutrient Concentrations: Temporal Relationships and Preliminary Standards. 2002 Citrus and Deciduous Fruit and Nut Research Report. University of Arizona, Tucson, AZ. <http://ag.arizona.edu/pubs/crops/az1303/az1303-16.pdf>

T.L. Thompson, S.A. White, J.L. Walworth, and G. Sower. 2002. Development of Best Management Practices for Fertigation of Young Citrus Trees. 2002 Citrus and Deciduous Fruit and Nut Research Report. University of Arizona, Tucson, AZ <http://ag.arizona.edu/pubs/crops/az1303/az1303-2.pdf>

T.L. Thompson, S.A. White, J.L. Walworth, and G.J. Sower. 2002. Optimum Fertigation Frequency for Subsurface Drip-Irrigated Broccoli on Medium-Textured Soils. <http://www.back-to-basics.com>

J.L. Walworth and J. Kelly. 2002. Managing Caliche in the Home Yard. The University of Arizona Cooperative Extension Publication AZ1281. The University of Arizona, Tucson, AZ.

D. Thelander, W. Accomazzo, S.R. Jones, A. Lopez, K.G. Rogers, W. Rousseau, E.G. Sander, J.E. Schafer, M. Somerville, and J.L. Walworth. 2001. Guide to Agricultural PM₁₀ Best Management Practices. 15 pp. Arizona Department of Environmental Quality.

Field, J.P. and J.L. Walworth. 2003. Impacts of Biosolids on Agricultural Lands. Pima Natural Resource Conservation District Newsletter.

Field, J.P. and J.L. Walworth. 2003. Guidelines for the Application of Biosolids to Agricultural Lands. Pima Natural Resource Conservation District Newsletter.

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J.L. Walworth and J. Kelly. 2002. Managing Caliche in the Home Yard. The University of Arizona Cooperative Extension Publication AZ1281. The University of Arizona, Tucson, AZ.

D. Thelander, W. Accomazzo, S.R. Jones, A. Lopez, K.G. Rogers, W. Rousseau, E.G. Sander, J.E. Schafer, M. Somerville, and J.L. Walworth. 2001. Guide to Agricultural PM₁₀ Best Management Practices. 15 pp. Arizona Department of Environmental Quality.

J.L. Walworth, C.R. Woolard, and J.F. Braddock. 1999. Nitrogen Management in Bioremediation. Soil & Groundwater Cleanup, Feb/March 1999, pp. 12-15.

J.L. Walworth, D.E. Carling, and J.E. Muniz. 1998. Nitrogen Requirements for Greenhouse Produced Lettuce Seedlings. University of Alaska Agricultural and Forestry Experiment Station Misc. Pub. 98-2. University of Alaska Fairbanks, Fairbanks, AK.

D.E. Carling, S.M. Dofing, and J.L. Walworth. 1996. Head Lettuce Variety Performance, Matanuska Valley, Alaska 1995. University of Alaska Agricultural and Forestry Experiment Station Circular 106. University of Alaska Fairbanks, Fairbanks, AK.

S.M. Dofing, J.L. Walworth, and D.E. Carling. 1996. Head Lettuce Variety Performance, Matanuska Valley, Alaska 1996. University of Alaska Fairbanks Agricultural and Forestry Experiment Station Circular No. 108.

D.E. Carling, J.L. Walworth, and J.S. Conn. 1995. Metam Sodium and Dasomet as Herbicides for Use by Vegetable Growers. University of Alaska Fairbanks Agricultural and Forestry Experiment Station Research Progress Report No. 34.

J.L. Walworth, D.E. Carling, and R.G. Gavlak. 1994. Rates and Methods of Application of Nitrogen and Phosphorus for Commercial Field Production of Head Lettuce in Southcentral Alaska. University of Alaska Agricultural and Forestry Experiment Station Bulletin 100, University of Alaska Fairbanks, Fairbanks, AK.

D.E. Carling, J.S. Conn, and J.L. Walworth. 1994. Potential of Metam Sodium as an Herbicide for Use by Vegetable Growers in Alaska. University of Alaska Agricultural and Forestry Experiment Station Progress Report No. 33, University of Alaska Fairbanks, Fairbanks, AK.

J.L. Walworth. 1992. Crop Production and Soil Management Series: Soil Fertility Basics. Field Crop Production Handbook: Alaska. University of Alaska Fairbanks Cooperative Extension Service Publication 100G-00242A.

J.L. Walworth. 1992. Crop Production and Soil Management Series: Plant Tissue Testing. Field Crop Production Handbook: Alaska. University of Alaska Fairbanks Cooperative Extension Service Publication 100G-00243D.

J.L. Walworth. 1992. Crop Production and Soil Management Series: Soil Sampling and Analysis. Field Crop Production Handbook: Alaska. University of Alaska Fairbanks Cooperative Extension Service Publication 100G-00044D.

J.L. Walworth. 1992. Field Crop Fertilizer Recommendations for Alaska: Potatoes. Field Crop Production Handbook: Alaska. University of Alaska Fairbanks Cooperative Extension Service Publication 100G-00246A.

J.L. Walworth. 1992. Field Crop Fertilizer Recommendations for Alaska: Vegetables. Field Crop Production Handbook: Alaska. University of Alaska Fairbanks Cooperative Extension Service Publication 100G-00643A.

J.L. Walworth, R.G. Gavlak, and J.E. Muniz. 1990. Effects of Potassium Source and Secondary Nutrients on Potato Yield and Quality in Southcentral Alaska. Alaska Agricultural and Forestry Experiment Station Progress Report Number 18.

D.E. Carling and J.L. Walworth. 1990. Effect of Hilling on Yield and Quality of Potatoes. Alaska Agricultural and Forestry Experiment Station Progress Report Number 16.

J.L. Walworth, R.G. Gavlak, and J.E. Muniz. 1990. Effects of Soil Fertility on Potato Plant Development in the Matanuska Valley. Alaska Agricultural and Forestry Experiment Station Progress Report Number 15.

J.L. Walworth, D.E. Carling, G.J. Michaelson, and C.L. Ping. 1990. Effects of Residual Soil Nitrogen and Applied Nitrogen on Yields of Head Lettuce. Alaska Agricultural and Forestry Experiment Station Progress Report Number 10.

R.G. Gavlak, D. Carling, M. Comeau, J. Purser, W. Vandre, J. Walworth, and C. Wright. 1990. Vegetable Variety Trials - Matanuska Valley 1989. Alaska Agricultural and Forestry Experiment Station Circular Number 80.

Websites

Soil Fertility. Webmaster Mr. Andrew Pond. http://ag.arizona.edu/swes/soil_fertility/

AZDRIP, The University of Arizona Subsurface Drip Irrigation Demonstration and Research Project. <http://cals.arizona.edu/crops/irrigation/azdrip/azdripindex.html> . Webmaster Mr. Scott White.

PRESENTATIONS (2000-2007)

Extension presentations: > 80

National and international presentations: >25

RESEACH PROJECTS (as Principal Investigator or Co-Principal Investigator))

Soil-Plant-Nutrient Relationships of *Populus fremontii*, *Salix gooddingii*, and *Salix exigua* during Native Habitat Restoration. A field study investigating water and nutritional requirements for re-vegetation of selected species during restoration of former agricultural land.

Mapping Accumulation of Soil Salinity in Landscapes Irrigated with Reclaimed Water. Evaluation of the long-term effect on soil salinity accumulation and distribution of irrigating landscaping plants in the Tucson region with reclaimed versus potable water using both direct and remote soil measurements.

A Soil-Applied Zinc Fertilization Program for Arizona Pecans. Whereas the standard for zinc fertilization on pecans grown in high pH soils is the expensive and time-consuming practice of repeatedly applying zinc directly to the foliage, we are studying the potential of supplying zinc via soil-placed zinc amendments. This study includes several zinc fertilizers applied to trees in an established pecan orchard and in a greenhouse study.

Determination of Nitrogen Requirements for Arizona Pecans. This study will provide information for development of nitrogen fertilizer recommendations for pecans grown

in the desert southwest. A range of nitrogen application levels are being evaluated for impact on pecan production and performance. Treatments were established in 2005, and crop response will be monitored for at least four growing seasons.

Manure-Nitrogen-Zinc Interaction in Pecans. Conducted in conjunction with INIFAP (Mexico), this research is designed to investigate the potential for improving zinc nutrition of pecan trees with mixed manure and inorganic zinc applications, and to evaluate nitrogen contributions from animal manure.

Turfgrass Systems for Saline Irrigation Water using Halophytic Grasses. Warm-season/cool-season turfgrass rotations are being evaluated for use in saline soils or with saline irrigation water. *Paspalum vaginatum*, a warm-season grass, in combination with *Puccinellia distans* and *Lolium perenne*, two cool-season grasses, are being tested.

Nutrient Requirements of Turf-Type Distichlis: Nitrogen and Iron. *Distichlis spicata* (Desert Saltgrass) is a new salt-tolerant turf developed at the University of Arizona. This study is being conducted to develop fertilizer management recommendations for this grass and focuses on nitrogen and iron management.

Consumptive Water Use by Seashore Paspalum, Bermudagrass, and Desert Saltgrass under Drought Stress Conditions. Consumptive water use by *Paspalum vaginatum*, *Cynodon dactylon*, and *Distichlis spicata* has been studied under well-watered conditions, but not during water stress. This study evaluates water consumption under stress conditions, and turf response to water stress.

Influence of Inorganic Nitrogen Fertilization and Headspace Oxygen Content on Petroleum Biodegradation in a Contaminated Sub-Antarctic Soil. This is a bench-scale evaluation of two parameters that will be manipulated in full-scale remediation of two contaminated sites on Macquarie Island, in the Australian sub-Antarctic. Lab studies are being conducted both at the University of Arizona and at the Australian Antarctic Division in Kingston, Tasmania. Results will be used to develop a remediation plan for the Macquarie Island sites, as well as contaminated sites on Antarctica.

Subsurface Drip Irrigation for Sustainable Production of Specialty Vegetable Crops in Arizona. This study is a long-term field scale comparison of furrow irrigation (a conventional system) with buried drip irrigation. Crop performance, soil, pest, and economic aspects are contrasted.