

TITLE: **Curriculum Vitae for Kenneth A. Barbarick**

BORN: July 19, 1951, Douglas Arizona

POSITIONS HELD

2001 to Present	<b>University Distinguished Teaching Scholar, Colorado State University</b>
1998-2012	Associate Department Head, Department of Soil and Crop Sciences, Colorado State University
1997-1998	Interim Head, Department of Soil and Crop Sciences, Colorado State University
1995-97	Associate Department Head, Department of Soil and Crop Sciences, Colorado State University
1994-95	Acting Head, Department of Soil and Crop Sciences, Colorado State University
1987 to present	Professor, Department of Soil and Crop Sciences, Colorado State University
1983-1987	Associate Professor, Department of Agronomy, Colorado State University
1983	Visiting Assistant Professor, Department of Agronomy and Soils, University of Hawaii
1979-1983	Assistant Professor, Department of Agronomy, Colorado State University

DEGREES RECEIVED:

B.S. May 1973	University of Arizona with "Highest Distinction and Honors", Soil and Water Science
M.S. May 1975	University of Arizona, Department of Soils, Water and Engineering
Ph.D. Aug 1979	Colorado State University, Department of Agronomy

MEMBERSHIP IN HONORARY ACADEMIC SOCIETIES

Phi Kappa Phi  
Blue Key  
Gamma Sigma Delta  
Alpha Zeta  
Sigma Xi

## HONORS AND AWARDS RECEIVED

R. Gardner Faculty Award, Department of Soil and Crop Sciences, 2006-2010  
USEPA 1<sup>ST</sup> Place 2005 Clean Water Act National Recognition Awards for Biosolids Exemplary Management, Research Activities  
USDA-NASULGC Food and Agriculture Sciences Excellence in Teaching Award, Western Region, 2004  
USEPA 1<sup>ST</sup> Place 2003 Clean Water Act National Recognition Awards for Biosolids Exemplary Management for Operating Projects (greater than 5 DMTD)  
University Distinguished Teaching Scholar, Colorado State University, 2001  
Gamma Sigma Delta, CSU Chapter, Senior Faculty Award of Merit, 2000  
Co-Winner American Metropolitan Sewerage Association (AMSA) National Environmental Achievement Award in the Research and Technology category with Cities of Littleton and Englewood, CO, 2000  
Co-Winner USEPA National Wastewater Management Research Award with Cities of Littleton and Englewood, CO, 1999  
Rocky Mountain Water Environment Association, State of Colorado Biosolids Management Merit Award with the Cities of Littleton and Englewood, CO, 1998  
ES COP/ACOP Leadership Internship, 1993-94  
Soil Science Society of America Fellow, 1992  
U.S. Environmental Protection Agency Outstanding Achievement Award, Region VIII, 1991  
American Society of Agronomy Fellow, 1991  
Soil Science Education Award from Soil Science Society of America, 1991  
Agronomic Resident Education Award from American Society of Agronomy, 1990  
National Association of Colleges and Teachers of Agriculture (NACTA) Teacher Fellow Award, 1988  
USEPA Beneficial Sewage Sludge Use Award Research Activities - as a member of W170 Regional Research Committee 1988  
CIBA-GEIGY Award from American Society of Agronomy, 1987  
CSU Shepardson Faculty Teaching Award in College of Agriculture Sciences, 1984  
Visiting Assistant Professor, Dept. of Agronomy and Soil Science, University of Hawaii, 1983  
CSU Alumni Faculty Award for the College of Agricultural Sciences, 1982 (Teaching Award)  
CSU Agronomy Club Outstanding Professor Award, 1981, 1984, 1995, 2001, 2008  
CSU Shepardson Graduate Student Teaching Award in College of Agricultural Sciences, 1978  
Gamma Sigma Delta Outstanding Graduate Student in Agriculture, University of Arizona, 1975  
Freeman Award for Outstanding Male Senior, University of Arizona, 1973  
American Society of Agronomy Outstanding Senior Award, University of Arizona, 1973  
President's Cup for 4.0 grade point average for 1970-71, Univ. of Arizona

## PROFESSIONAL POSITIONS HELD

President - American Society of Agronomy, 2012  
President Elect - American Society of Agronomy, 2011  
Incoming President Elect – American Society of Agronomy, 2010

American Society of Agronomy Editor-in-Chief, 2003-2008  
*Agronomy Journal*, Editor, 1996-2001  
*Agronomy Journal*, Technical Editor (Soils), 1990-1995  
*Agronomy Journal*, Associate Editor, 1987-1990  
Liaison to Coalition for Earth Science Education for Soil Science Society of America, 1993-94  
Soil Science Education Award Committee - Soil Science Society of America, 1987-88, 1993-94 (Chair 1994), 2008-9 (Chair 2009)  
Emil Truog Award - Soil Science Society of America, 1995-96  
CIBA-GEIGY Award - American Society of Agronomy, 1994-95 (Chair 1995)  
American Society of Agronomy - Board of Directors, 1986-1989  
American Society of Agronomy Ad Hoc Committee to Evaluate *Journal of Agronomic Education*, Chairman, 1986-1987  
American Society of Agronomy - Member Student Achievement Booklet Committee, 1986-88  
Western Representative 1985, and Secretary to W-170 research group, 1986-91, Co-Chairman, 1990-1994  
Session Chair Division A-5, 1990 American Society of Agronomy Annual Meeting  
Session Chair Division S-8, 1986 Soil Science Society of America Annual Meeting  
National President, American Society of Agronomy Student Activities Subdivision, 1972-73  
ASA-SAS National Speech Contest Judge - 4 different years  
ASA-SAS National Photography Contest Judge, 1992

## PROFESSIONAL PUBLICATIONS

### A. Books Written

Sabey, B. R., and K. A. Barbarick. 1981. Student Study Guide to Soil Science. Burgess Publishing Co., Minneapolis, MN.

Barbarick, K. A. 1981. Lecture Notes for Introductory Soil Science. Burgess Publishing Co., Minneapolis, MN.

Barbarick, K. A. 1983. Soil Fertility Laboratory Manual. University of Hawaii - Manoa.

Sabey, B. R., and K. A. Barbarick. 1983. Student Study Guide to Soil Science. Second Edition. Burgess Publishing Co., Minneapolis, MN.

Barbarick, K. A. 1984. Lecture Notes for Introductory Soil Science, Second Edition. Burgess Publishing Co., Minneapolis, MN.

Sabey, B. R., and K. A. Barbarick. 1984. Student Study Guide to Soil Science. Third Edition. Burgess Publishing Co., Minneapolis, MN.

Barbarick, K. A. 1989. Lectures Notes for Introductory Soil Science, Third Edition. Burgess Publishing Co., Minneapolis, MN.

Barbarick, K. A., and K. G. Doxtader. 1991. Laboratory Manual for Introductory Soil Science. Fourth Edition. Burgess Publishing Co., Minneapolis, MN.

Barbarick, K. A. 1991. Lecture Notes for Introductory Soil Science, Fourth Edition, Burgess Publishing, Co., Minneapolis, MN.

Barbarick, K. A. 1993. Lecture Note for Introductory Soil Science Fifth Edition, Burgess Publishing, Co., Minneapolis, MN.

Barbarick, K. A., and K. G. Doxtader. 1994. Laboratory Manual for Introductory Soil Science. Fifth Edition. Burgess Publishing Co., Minneapolis, MN.

Barbarick, K. A., and K. G. Doxtader. 1996. Laboratory Manual for Introductory Soil Science. Sixth Edition. Burgess Publishing Co., Minneapolis, MN.

Barbarick, K. A. 1997. Lecture Note for Introductory Soil Science Sixth Edition, Burgess Publishing, Co., Minneapolis, MN.

Barbarick, K. A., K. G. Doxtader, and J.A Ippolito. 1999. Laboratory Manual for Introductory Soil Science. Seventh Edition. Burgess Publishing Co., Minneapolis, MN.

Barbarick, K. A. 2000. Lecture Notes for Introductory Soil Science. Seventh Edition. Pearson Publishing Co., Boston, MA.

Barbarick, K. A., K. G. Doxtader, and J.A Ippolito. 2003. Laboratory Manual for Introductory Soil Science. Eighth Edition. Pearson Publishing Co., Boston, MA.

Barbarick, K. A. 2004. Lecture Notes for Introductory Soil Science. Eighth Edition. Pearson Publishing Co., Boston, MA.

Barbarick, K. A., K. G. Doxtader, and J.A Ippolito. 2007. Laboratory Manual for Introductory Soil Science. Ninth Edition. Pearson Publishing Co., Boston, MA.

Barbarick, K. A. 2008. Lecture Notes for Introductory Soil Science. Ninth Edition. Pearson Publishing Co., Boston, MA.

Barbarick, K. A., K. G. Doxtader, and J.A Ippolito. 2010. Laboratory Manual for Introductory Soil Science. Tenth Edition. Pearson Publishing Co., Boston, MA.

B. Books Edited

Associate Editor: Pond, W. F., and M. A. Mumpton. 1984. Zeo-Agriculture: Use of Zeolites in Agriculture and Aquaculture. Westview Press, Boulder, CO.

C. Technical Papers

i. Chapters of Books

Barbarick, K. A. 1974. Water - the possible limit to Arizona's growth? In: Land use Planning for Arizona. Arizona Academy Twenty-fourth Arizona Town Hall. April 1974. pp. 52-57, 58-61, 66-71.

Barbarick, K. A., and H. J. Pirela. 1984. Agronomic and horticultural uses of zeolites: A review. In: Zeo-Agriculture: Use of Natural Zeolites in Agriculture and Aquaculture. W. G. Pond and F. A. Mumpton, eds. Westview Press, Boulder, CO. pp. 93-103.

Pirela, H. J., D. G. Westfall, and K. A. Barbarick. 1984. Use of clinoptilolite in combination with nitrogen fertilizer to increase plant growth. In: Zeo-Agriculture: Use of Natural Zeolites in Agriculture and Aquaculture. W. G. Pond and F. A. Mumpton, eds. Westview Press, Boulder, CO, pp. 113-124.

Weber, M. A., K. A. Barbarick, and D. G. Westfall. 1984. Application of clinoptilolite to soil amended with sewage sludge. In: Zeo-Agriculture: Use of Natural Zeolites in Agriculture and Aquaculture. W. F. Pond and F. A. Mumpton, eds. Westview Press, Boulder, CO, pp. 263-271.

Sommers, L.E., and K.A. Barbarick. 1986. Constraints to land application of sewage sludge. In Utilization, Treatment, and Disposal of Waste on Land. Soil Science Society of America. Madison, WI.

K. A. Barbarick, and L. E. Sommers. 1991. Municipal Waste as a fertilizer material. In: E.G. Siemer (Ed.). Proceedings of the Third Intermountain Meadow Symposium. Colorado Agricultural Experiment Station Bulletin LTB91-1, pp. 173-180.

Sommers, L. E., K. A. Barbarick, and D. B. Levy. 1991. Behavior of trace metals in mountain meadow soils. In: E. G. Siemer (Ed.) Proceedings of the Third Intermountain Meadow Symposium. Colorado Agricultural Experiment Station Bulletin LTB 91-2, pp. 181-193.

Barbarick, K.A. 1994. Undergraduate core curriculum in soil science. *Soil Sci. Soc. Am. Special Publication on Soil Science Education: Philosophy and Perspectives* Soil Sci. Soc. Am. Spec. Pub. no. 37, pp. 7-14.

Eberl, D.D., K.A. Barbarick, and T.M. Lai. 1995. Influence of NH<sub>4</sub>-exchanged clinoptilolite on nutrient concentrations in sorghum-sudangrass. *In Natural Zeolites >93 Occurrence, Properties, Use*. D.W. Ming and F.A. Mumpton (eds.). International Committee on Natural Zeolites. Brockport, NY. pp. 491-504.

Eghball, B., and K.A. Barbarick. 2002. Manure, Compost, and Biosolids. *In Encyclopedia of Soil Science*. R. Lal (ed.). Marcel Dekker, Inc. New York.

Eghball, B., and K.A. Barbarick. 2005. Manure, Compost, and Biosolids. *In Encyclopedia of Soil Science*. R. Lal (ed.). Marcel Dekker, Inc. New York. **(Revised from 2002)**

ii. Refereed articles in scientific journals

Barbarick, K. A., and D. F. Post. 1974. Use of undergraduate teaching assistants for basic soils instruction. *J. Agron. Educ.* 3:101-103.

Barbarick, K. A., A. W. Warrick, and D. F. Post. 1976. Percolation test for septic tank suitability in southern Arizona soils. *J. Soil and Water Cons.* 31(3):110-112.

Post, D. F., K. A. Barbarick, and J. L. Ahlrichs. 1976. Collecting and preparing micro, miniature, and macro soil profiles. *J. Agron. Educ.* 5:9-16.

Barbarick, K. A., and B. R. Sabey. 1978. Grade inflation at Colorado State University. The Department of Agronomy's opinion. *J. Agron. Educ.* 7:44-46.

Barbarick, K. A., B. R. Sabey, and A. Klute. 1979. Comparison of various methods of extracting soil water for determining ionic salts, sodium, and calcium content in soil columns. *Soil Sci. Soc. Am. J.* 43:1053-1055.

Barbarick, K. A., A. Klute, and B. R. Sabey. 1980. Application of sewage effluent to columns of a mountain meadow soil: I. Errors in calculating transport of ionic salts. *Soil Sci. Soc. Am. J.* 44:921-925.

Barbarick, K. A. 1980. A soil temperature demonstration. *J. Agron. Educ.* 9:76-80.

Huffman, S. A., and K. A. Barbarick. 1981. Soil nitrate analysis by cadmium reduction. *Comm. in Soil Sci. and Plant Anal.* 12:79-89.

Barbarick, K. A., B. R. Sabey, and N. A. Evans. 1982. Application of the waste water effluent of a rural community to a mountain meadow. *J. Water Poll. Control. Fed.* 54:70-76.

Barbarick, K. A., A. Klute, and B. R. Sabey. 1983. Errors in calculating the flux of sodium in soil columns. *Soil Sci.* 136:1-9.

Weber, M. A., K. A. Barbarick, and D. G. Westfall. 1983. Ammonium adsorption by a zeolite in a static and dynamic system. *J. Environ. Qual.* 12:549-552.

Simeoni, L. A., K. A. Barbarick, and B. R. Sabey. 1984. Effect of small scale composting of sewage sludge on the uptake of heavy metals. *J. Environ. Qual.* 13:264-268.

Barbarick, K. A. 1985. A note-taking strategy for Introductory Soil Science. *NACTA J.* 29(1):73-74.

Barbarick, K. A. 1985. Potassium fertilization of alfalfa grown on a soil high in potassium. *Agron. J.* 77:442-445.

Barbarick, K. A. 1985. Computer assisted learning in Introductory Soil Science. *J. Agron. Educ.* 14:77-80.

Utschig, J. M., K. A. Barbarick, D. G. Westfall, R. H. Follett, and T. M. McBride. 1986. Application of liquid sewage sludge versus nitrogen fertilizer on dryland winter wheat. *BioCycle* 27(7):30-33.

Barbarick, K. A., and S. M. Workman. 1987.  $\text{NH}_4\text{HCO}_3$ -DTPA and DTPA extractions of sludge-amended soils. *J. Environ. Qual.* 16:125-130.

Russell, R. E., D. G. Westfall, and K. A. Barbarick. 1987. Spring N fertilization of dryland winter wheat. *Fertilizer Issues* 4:73-78.

Barbarick, K. A., W. A. Anderson, D. R. Hicks, N. W. Hopper, G. Joliff, T. E. Lonyachan, and D. F. Post. 1988. Surveys evaluating *Journal of Agronomic Education*. *J. Agron. Educ.* 17:63-68.

Heil, D. M., and K. A. Barbarick. 1989. Water treatment sludge influence on the growth of sorghum-sudangrass. *J. Environ. Qual.* 18:292-298.

Vaughan, B., K. A. Barbarick, D. G. Westfall, and P. L. Chapman. 1989. Tissue N levels for dryland hard red winter wheat. *Agron. J.* 82:561-565.

Barbarick, K. A., T. M. Lai, and D. D. Eberl. 1989. Exchange fertilizer (phosphate rock plus  $\text{NH}_4$ -zeolite) effects on sorghum-sudangrass. *Soil Sci. Soc. Am. J.* 54:911-916.

- Vaughan, B., D. G. Westfall, K. A. Barbarick, and P. L. Chapman. 1989. Spring N fertilizer recommendation models for dryland winter wheat. *Agron. J.* 82:565-571.
- Lerch, R. N., K. A. Barbarick, D. G. Westfall, R. H. Follett, T. M. McBride, and W. F. Owen. 1990. Sustainable rates of sewage sludge for dryland winter wheat production. I. Soil nitrogen and heavy metals. *J. Prod. Agric.* 3:60-65.
- Lerch, R. N., K. A. Barbarick, D. G. Westfall, R. H. Follett, T. M. McBride, and W. F. Owen. 1990. Sustainable rates of sewage sludge for dryland wheat production. II. Production and income. *J. Prod. Agric.* 3:66-71.
- Vaughan, B., D. G. Westfall, and K. A. Barbarick. 1990. Economics of N fertilization of dryland winter wheat. *J. Prod. Agric.* 3:324-328.
- Westfall, D. G., B. Vaughan, and K. A. Barbarick. 1990. Nitrogen fertility program for intensely managed dryland winter wheat. *J. Fert. Issues* 7:1-5.
- Barbarick, K. A. 1991. Polyhalite application to sorghum-sudangrass and leaching in soil columns. *Soil Sci.* 151:159-166.
- Melo, I., and K. Barbarick. 1988. Effects of liquid and dry sewage sludges on the yield, nitrogen uptake and heavy metal content in corn. *Agronomic Luistana* 43:287-307. (Published in 1991).
- Barbarick, K.A. 1992. An environmental issues in agronomy course. *J. Natr. Res. and Life Sci. Educ.* 21:61-63.
- Levy, D.B., K.A. Barbarick, E.G. Siemer, and L.E. Sommers. 1992. Distribution and partitioning of copper, cadmium, lead, and zinc in mine contaminated soils near Leadville, Colorado. *J. Environ. Qual.* 21:185-195.
- Lerch, R.N., K.A. Barbarick, L.E. Sommers, and D.G. Westfall. 1992. Evaluation of sewage sludge proteins as labile carbon and nitrogen sources. *Soil Sci. Soc. Am. J.* 56:1470-1476.
- Lerch, R.N., K.A. Barbarick, P. Azari, L.E. Sommers, and D.G. Westfall. 1993. The study of sewage sludge proteins I. Extraction methodology. *J. Environ. Qual.* 22:620-624.
- Lerch, R.N., P. Azari, K.A. Barbarick, L.E. Sommers, and D.G. Westfall. 1993. The study of sewage sludge proteins II. Extract characterization. *J. Environ. Qual.* 22:625-629.
- Harris-Pierce, R.L., E.F. Redente, and K.A. Barbarick. 1995. Sewage sludge effects on runoff water quality in a semi-arid grassland. *J. Environ. Qual.* 24:112-115.



- Barbarick, K.A., J.A. Ippolito, and D.G. Westfall. 1995. Biosolids effect on P, Cu, Zn, Ni, Mo concentrations in dryland wheat. *J. Environ. Qual.* 24:608-611.
- Barbarick, K.A., J.A. Ippolito, and D.G. Westfall. 1996. Distribution and mineralization of biosolids N applied to dryland wheat. *J. Environ. Qual.* 25:796-801.
- Barbarick, K.A., J.A. Ippolito, and D.G. Westfall. 1997. Sewage biosolids cumulative effects on extractable-soil and grain elemental concentrations. *J. Environ. Qual.* 26:1696-1702.
- Barbarick, K.A., J.A. Ippolito, and D.G. Westfall. 1998. Extractable elements in the soil profile after years of biosolids application. *J. Environ. Qual.* 27:801-805.
- Pierce, B.L., E.F. Redente, K.A. Barbarick, R.B. Brobst, and P. Hegeman. 1998. Plant biomass and elemental changes in shrubland forages following biosolids application. *J. Environ. Qual.* 27:789-794.
- Barbarick, K.A. 1998. Exam frequency comparison in Introductory Soil Science. *J. Nat. Resour. Life Sci. Educ.* 27:55-58.
- Bauder, T.A., K.A. Barbarick, J.F. Shanahan, P. Ayers, and P. Chapman. 1999. Drilling-fluid (mud) effects on sorghum-sudangrass growth and Fe availability. *J. Environ. Qual.* 28:744-749.
- Ippolito, J.,A., K.A. Barbarick, and E.F. Redente. 1999. Co-application effects of water treatment residuals and biosolids on two range grasses. *J. Environ. Qual.* 28:1644-1650.
- Barbarick, K.A., and J.A. Ippolito. 2000. Nitrogen fertilizer equivalency of sewage biosolids applied to dryland winter wheat. *J. Environ. Qual.* 29: 1345-1351.
- Ippolito, J.A., and K.A. Barbarick. 2000. Modified nitric acid plant tissue digest method. *Comm. Soil Sci. Plant Anal.* 31:2473-2482.
- Meyer, V.F., E.F. Redente, K.A. Barbarick, and R. Brobst. 2001. Biosolids application affect runoff water quality following forest fire. *J. Environ. Qual.* 30:1528-1532.
- Ippolito, J.A., and K.A. Barbarick. 2001. Environmental management of biosolids and water treatment residuals. WEF/AWWA/CWEA Joint Residuals and Biosolids Management Conference Proceedings Biosolids 2001: "Building Public Support" proceedings. Feb. 21-25. San Diego, CA.
- Stowe, D.W., C.J. Caudill, J.E. Tallent, Jr., K.A. Barbarick, and J.A. Ippolito. 2001. Long term

biosolids research on dryland wheat farms. WEF/AWWA/CWEA Joint Residuals and Biosolids Management Conference Proceedings Biosolids 2001: "Building Public Support" proceedings. Feb. 21-25. San Diego, CA.

Al-Wabel, M.A., D.M. Heil, D.G. Westfall, and K.A. Barbarick. 2002. Solution chemistry influence on metal mobility in biosolids-amended soils. *J. Environ. Qual.* 31:1157-1165.

Ippolito, J.A., K.A. Barbarick, and E.F. Redente. 2002. Combinations of water treatment residuals and biosolids affect on two range grasses. *Comm. Soil Sci. Plant Anal.* 33:831-844.

Barbarick, K.A., and J.A. Ippolito. 2003. Does the number of hours studied affect exam performances? *J. Nat. Res. Life Sci. Educ.* 32:32-35.

Barbarick, K.A., and J.A. Ippolito. 2003. Termination of sewage biosolids application affects wheat yield and other agronomic characteristics. *Agron. J.* 95:1288-1294.

Ippolito, J.A., and K.A. Barbarick. 2003. A simple C/N assay for Introductory Soil Science classes. *J. Nat. Res. Life Sci. Educ.* 32:69-72.

Ippolito, J.A., K.A. Barbarick, D.M. Heil, J.P. Chandler, and E.F. Redente. 2003. Possible phosphorus retention mechanisms of a water treatment residual. *J. Environ. Qual.* 32:1857-1864.

Lagae, H., K. Barbarick, and S. Davies. 2003. Soil organic matter - the missing piece of the productivity puzzle? *J. Agric. Res. Econ.* 28:656.

Barbarick, K.A., K.G. Doxtader, E.F. Redente, and R.B. Brobst. 2004. Biosolids effects on microbial activity in shrubland and grassland soils. *Soil Sci.* 169:176-187.

Meyer, V.F., E.F. Redente, K. A. Barbarick, R.B. Brobst, M.W. Paschke, and A.L. Miller. 2004. Plant and soil responses to biosolids application following forest fire. *J. Environ. Qual.* 33:873-881.

Al-Sheikh, A., J.A. Delgado, K. Barbarick, R. Sparks, M. Dillon, Y. Qian, and G. Cardon. 2005. Effects of potato-grain rotations on soil erosion, carbon dynamics and properties of rangeland sandy soils. *J. Soil Till. Res.* 81:227-238.

Bauder, T.A., K.A. Barbarick, J.F. Shanahan, and P.D. Ayers. 2005. Soil properties affecting wheat yields following drilling-fluid application. *J. Environ. Qual.* 34:1455-1932.

Ippolito, J.A., E.F. Redente, and K.A. Barbarick. 2005. Amendments affect pH and salt content of red mud. *Soil Sci.* 170:832-841.

Barbarick, K.A., J.A. Ippolito, G. Butters, and G. Sorge. 2005. An infiltration exercise for introductory soil science. *J. Nat. Res. Life Sci. Educ.* 34:72-76.

Ippolito, J.A., and K.A. Barbarick. 2006. Phosphorus Extraction Methods from Water Treatment Residual-Amended Soil. *Comm. Soil Sci. Plant Anal.* 37:859-870.

Ippolito, J.A., and K.A. Barbarick. 2006. Biosolids affect soil Ba in a dryland wheat agroecosystem. *J. Environ. Qual.* 35:2333-2341.

Ippolito, J., M. Stromberger, K. Barbarick, and R. Bayley. 2006. Water residuals and biosolids: Effect of co-application on soil phosphorus. Awwa Research Foundation, Denver, CO. 49 p.

Ippolito, J.A., K.A. Barbarick, and K.L. Norvell. 2007. Biosolids impact soil phosphorus accountability, fractionation, and potential environmental risk. *J. Environ. Qual.* 36:764-772.

Barbarick, K.A., and J.A. Ippolito. 2007. Nutrient assessment of a dryland agroecosystem after 12 years of biosolids application. *Agron. J.* 99:715-722.

Pearson, C.H., S.M. Ernst, K.A. Barbarick, J.L. Hatfield, G.A. Peterson, and D.R. Buxton. 2008. *Agronomy Journal* turns 100. *Agron. J.* 100:1-8.

Barbarick, K.A., and J.A. Ippolito. 2008. Predicting soil-extractable zinc, phosphorus, iron, and copper in a biosolids-amended dryland-wheat agroecosystem. *Soil Sci.* 173:175-185.

Bailey, R., Ippolito, J.A., M. Stromberger, K. Barbarick, and M. Paschke. 2008. Water treatment residuals and biosolids co-applications affect semi-arid rangeland phosphorus cycling. *Soil Sci. Soc. Am. J.* 72:711-719.

Mauch, K.J., J.A. Delgado, W.C. Bausch, K. Barbarick, and G. MacMaster. 2008. New weighing method to measure shoot water interception. *Journal of Irrigation and Drainage Engineering (ASCE)* 134:349-355.

Ippolito, J.A., and K.A. Barbarick. 2008. Fate of biosolids trace metals in a dryland wheat agroecosystem. *J. Environ. Qual.* 37:2135-2144.

Bayley, R.M., J.A. Ippolito, M.E. Stromberger, K.A. Barbarick, and M.W. Paschke. 2008. Water treatment residuals and biosolids co-applications affect the activity of phosphatases in a semi-arid rangeland soil. *Comm. Soil Sci. Plant Anal.* 39:2812-2826.

Barbarick, K.A., and J.A. Ippolito. 2009. Continuous biosolids application affects grain elemental concentrations in a dryland-wheat agroecosystem. *J. Agric. Ecosys. Environ.* 129:340-343.

DePaz, J.M., J.A. Delgado, C. Ramos, M.J. Shaffer, and K.A. Barbarick. 2009. Use of a new GIS nitrogen index assessment tool for evaluation of nitrate leaching across a Mediterranean region. *J. Hydrol.* 365:183-194.

Ippolito, J.A., K.A. Barbarick, and R. Brobst. 2009. Fate of Biosolids Cu and Zn in a Semi-Arid Grassland. *J. Agric. Ecosys. Environ.* 131:325-332.

Lagae, H., M. Langemeir, D. Lybecker, and K. Barbarick. 2009. Economic value of biosolids in a semi-arid agroecosystem. *Agron. J.* 101:933-939.

Ippolito, J.A., and K.A. Barbarick. 2009. Water Treatment Residuals and Biosolids Long-Term Co-Applications Effects to Semi-Arid Grassland Soils and Vegetation. *Soil Sci. Soc. Am. J.* 73:1880-1889.

Ippolito, J.A., and K.A. Barbarick. 2009. Fate of biosolids Cu and Zn in a semi-arid grassland. *Agricult. Ecosys. Environ.* 131: 325-332.

Ippolito, J.A., K.G. Scheckel, and K.A. Barbarick. 2009. Selenium adsorption to aluminum-based water treatment residuals. *J. Colloid Interface Sci.* 338:48-55.

Ippolito, J.A., K.A. Barbarick, M.E. Stromberger, M.W. Pasche, and R.B. Brobst. 2009. Water treatment residuals and biosolids long term co-applications effects to semi-arid grassland soils and vegetation. *Soil Sci. Soc. Am. J.* 1880-1889.

Ippolito, J.A., K.A. Barbarick, M.W. Paschke, and R.B. Brobst. 2010. Infrequent composted biosolids applications affect semi-arid grassland soils and vegetation. *J. Environ. Manage.* 91:1123-1130.

Barbarick, K.A., J.A. Ippolito, and J. McDaniel. 2010. Fifteen years of wheat yield, N-uptake, and soil nitrate-N dynamics in a biosolids-amended agroecosystem. *Agricult. Ecosys. Environ* 132: 116-120.

Barbarick, K.A. 2010. Crossword puzzles as learning tools in Introductory Soil Science. *J. Nat. Res. Life Sci. Educ.* 39:145-149.

Ippolito, J.A., K.A., Barbarick, and H.A. Elliott. 2011. Drinking water treatment residuals: A review of recent uses. *J. Environ. Qual.* 40:1-12.

Figuroa-Viramontes, U, JA Delgado, JA Cueto-Wong, , G Nunez-Hernandez, DG Reta-Sanchez, and KA Barbarick. 2011. A new Nitrogen Index to evaluate nitrogen losses in intensive forage systems in Mexico. *Agric. Ecosys. Environ.* 142: 352-364.

Herrera, J.M., J.A. Delgado, M. Dillion, K.A. Barbarick, and G.S. McMaster. 2011. Accumulation of late-applied nitrogen and root dynamics during grain filling in irrigated spring wheat. *Comm. Soil Sci. Plant Anal.*42:2235-2249.

Barbarick, K.A., J.A. Ippolito, J. McDaniel, N.C. Hansen, and G.A. Peterson. 2012. Biosolids application to no-till dryland agroecosystems. *Agric. Ecosys. Environ.* 150:72-81.

iii. Technical bulletins and reports

Barbarick, K. A., B. R. Sabey, and N. A. Evans. 1977. Land treatment of municipal sewage effluent at Hayden, Colorado. Colorado Water Resources Institute. Technical Report No. 17. Colorado State University, Fort Collins, CO.

Barbarick, K. A., J. M. Utschig, D. G. Westfall, R. H. Follett, and T. McBride. 1984. Application of the liquid/anaerobically digested sewage sludge from Littleton/Englewood to dryland winter wheat in Bennett, Colorado, 1982-83. Progress Report No. 10, Colorado State University Agricultural Experiment Station.

Barbarick, K. A. 1985. Chemistry and bioavailability of waste constituents in soils. In: CSU Agronomy Research Report. pp. A-1 to A-6.

Barbarick, K. A. 1985. Potassium fertilization of alfalfa grown on a soil high in potassium. In: CSU Agronomy Research Report. pp. A-7 to A-11.

Utschig, J. M., K. A. Barbarick, D. G. Westfall, R. H. Follett, and T. M. McBride. 1985. Application of the liquid/anaerobically digested sewage sludge dryland winter wheat. Technical Report 85-6. Colorado State University Agricultural Experiment Station.

Barbarick, K. A. 1985. Potassium fertilization of alfalfa grown on a soil high in potassium. *Agron. J.* 77:442-445. Reprinted in *Potash Review* 7(12):1-8.

Russell, R. E., D. G. Westfall, and K. A. Barbarick. 1986. Fall and spring nitrogen fertilization of dryland winter wheat. Technical Report 86-8. Colorado State University Agricultural Experiment Station.

Barbarick, K. A., D. G. Westfall, R. H. Follett, R. Lerch, and T. M. McBride. 1986. Application of

anaerobically digested sewage sludge to dryland winter wheat. Technical Report 86-9. Colorado Agricultural Experiment Station.

Barbarick, K. A., J. M. Utschig, D. G. Westfall, and R. H. Follett. 1986. Liquid sludge incorporation and nitrogen availability to dryland winter wheat. Technical Bulletin 86-2. Colorado Agricultural Experiment Station.

Barbarick, K. A., J. M. Utschig, D. G. Westfall, and R. H. Follett. 1986. Application of anaerobically digested sewage sludge to dryland winter wheat. In: CSU Agronomy Research Report p. 15.

Barbarick, K. A., R. Lerch, J. M. Utschig, D. G. Westfall, R. H. Follett, T. M. McBride, and W. F. Owen. 1987. Application of municipal sewage sludge to dryland winter wheat. Waste Management Conference - Focus on the West Proceedings. Fort Collins, CO.

Barbarick, K. A., R. Lerch, D. G. Westfall, R. H. Follett, and T. M. McBride. 1987. Application of anaerobically digested sewage sludge to dryland wheat. Technical Report 87-10. Colorado Agricultural Experiment Station.

Vaughan, B., D. G. Westfall, and K. A. Barbarick. 1987. Nitrogen fertilization timing alternatives for dryland winter wheat. Technical Report 87-13. Colorado Agricultural Experiment Station.

Barbarick, K. A., T. M. Lai, and D. D. Eberl. 1988. Response of sorghum-sudangrass in soils amended with phosphate rock and zeolite (clinoptilolite). Technical Bulletin, Colorado Agricultural Experiment Station TB 88-1.

Lerch, R. N., K. A. Barbarick, D. G. Westfall, R. H. Follett, T. M. McBride, and W. F. Owen. 1988. Application of anaerobically digested sewage sludge to dryland wheat. Technical Report, Colorado Agricultural Experiment Station TR88-8.

Barbarick, K. A. 1989. Polyhalite as a potassium fertilizer. Technical Bulletin TB89-2, Colorado Agricultural Experiment Station.

Lerch, R. N., K. A. Barbarick, D. G. Westfall, R. H. Follett, T. M. McBride, and W. F. Owen. 1989. Application of anaerobically digested sewage sludge to dryland winter wheat. Technical Report TR89-8, Colorado Agricultural Experiment Station.

Levy, D., K. A. Barbarick, E. G. Siemer, and L. E. Sommers. 1989. Heavy metal contamination in soil and plant species of the Arkansas Valley near Leadville, Colorado. Technical Report TR89-7, Colorado Agricultural Experiment Station.

Westfall, D. G., B. Vaughan, and K. A. Barbarick. 1990. Spring nitrogen recommendation model for intensively managed dryland winter wheat. Maximum Economic Yield Conference Proceedings, Denver, CO.

CSRS Technical Committee W-170. 1990. Peer Review - Standards for the Disposal of sewage Sludge U.S. EPA Proposed Rule 40 CFR Parts - 257 and 503, CSRS-USDA. Technical Committee W170.

Lerch, R. N., K. A. Barbarick, D. G. Westfall, R. H. Follett and R. Jepson. 1990. Application of anaerobically digested sewage sludge to dryland wheat. Technical Report TR90-6, Colorado Agricultural Experiment Station.

Barbarick, K. A., R. N. Lerch, D. G. Westfall, R. H. Follett, J. Ippolito, and R. Jepson. 1991. Application of anaerobically digested sewage sludge to dryland winter wheat. Technical Report TR91-5, Colorado Agricultural Experiment Station.

Barbarick, K.A., T. M. Lai, and D. D. Eberl. 1991. Pine ridge zeolite and Fort Hall mill shale P effects on sorghum-sudangrass. Colo. Agric. Exp. Stn. Bulletin. TB91-2.

Barbarick, K.A., R.N. Lerch, J.M. Utschig, D.G. Westfall, R.H. Follett, J. Ippolito, R. Jepson, and T. McBride. 1992. Eight years of sewage sludge addition to dryland winter wheat. Colo. Agric. Exp. Stn. Bulletin. TB92-1.

Barbarick, K.A., J. Ippolito, D.G. Westfall, R.H. Follett, and R. Jepson. 1992. Fate of sewage sludge nitrogen applied to soils. Colorado Agricultural Experiment Station Bulletin TB92-3.

Ippolito, J., K.A. Barbarick, D.G. Westfall, R.H. Follett, and R. Jepson. 1992. Application of anaerobically digested sewage sludge to dryland winter wheat. Colorado Agricultural Experiment Station Technical Report. TR92-5.

Ippolito, J., K.A. Barbarick, D.G. Westfall, R.H. Follett, and R. Jepson. 1993. Application of anaerobically digested sewage sludge to dryland winter wheat. Colorado Agricultural Experiment Station Technical Report. TR93-5.

Harris-Pierce, R.L., E.F. Redente, and K.A. Barbarick. 1993. The effect of sewage sludge application on native rangeland soils and vegetation: Fort Collins-Meadow Springs Ranch. Colorado Agricultural Experiment Station Technical Report. TR93-6.

Ippolito, J., K.A. Barbarick, D.G. Westfall,, and R. Jepson. 1994. Application of anaerobically digested biosolids to dryland winter wheat. Colorado Agricultural Experiment Station Technical Report. TR94-6.

Ippolito, J., K.A. Barbarick, and R. Jepson. 1995. Application of anaerobically digested biosolids to dryland winter wheat. Colorado Agricultural Experiment Station Technical Report. TR95-4.

Ippolito, J., K.A. Barbarick, and R. Jepson. 1996. Application of anaerobically digested biosolids to dryland winter wheat. Colorado Agricultural Experiment Station Technical Report. TR96-6.

Ippolito, J., K.A. Barbarick, and R. Jepson. 1997. Application of anaerobically digested biosolids to dryland winter wheat. Colorado Agricultural Experiment Station Technical Report. TR97-6.

Barbarick, K.A. 1997. Winter wheat response to biosolids (sewage sludge) additions. *In* J. Johnson (ed.) Making Better Decisions - 1996 Winter Wheat Variety Performance Trial Results. Colorado Agricultural Experiment Station Technical Report. TR97-7.

Lang, M.E., J.A. Billica, K.A. Barbarick, E. Redente, B.A. Janonis, and G. McGaha-Miller. 1997. Evaluating the impacts of applying biosolids and water treatment residuals to rangeland. *In* Proceedings of the WEF/AWWA Joint Residuals/Biosolids Management Approaching 2000 Conference, Philadelphia, PA.

Barbarick, K., J. Ippolito, and D. Westfall. 1998. Distribution of extractable trace elements in the soil profile after several years of biosolids application. *In* Great Plains Soil Fertility Conference Proceedings. Volume 7. Denver, CO.

Ippolito, J., K.A. Barbarick, and R. Jepson. 1998. Application of anaerobically digested biosolids to dryland winter wheat. Colorado Agricultural Experiment Station Technical Report. TR98-4.

Ippolito, J., K.A. Barbarick, and R. Jepson. 1999. Application of anaerobically digested biosolids to dryland winter wheat. Colorado Agricultural Experiment Station Technical Report. TR99-8.

Ippolito, J., K.A. Barbarick, and R. Jepson. 2000. Application of anaerobically digested biosolids to dryland winter wheat. Colorado Agricultural Experiment Station Technical Report. TR00-5.

Ippolito, J., K.A. Barbarick, and T. Gourd. 2001. Application of anaerobically digested biosolids to dryland winter wheat. Colorado Agricultural Experiment Station Technical Report. TR01-5.

Barbarick, K.A., and J.A. Ippolito. 2001. Wheat grain and soil changes following termination of sewage biosolids application. Colorado Agricultural Experiment Station Technical Bulletin. TB01-1.

Ippolito, J., K.A. Barbarick, and T. Gourd. 2002. Application of anaerobically digested biosolids to dryland winter wheat. Colorado Agricultural Experiment Station Technical Report. TR02-5.



Barbarick, K.A., J.A. Ippolito, and G.A. Peterson. 2003. Biosolids application to no-till dryland crop rotations. Colorado Agricultural Experiment Station Technical Report. TR03-5.

Ippolito, J., K.A. Barbarick, and T. Gourd. 2003. Application of anaerobically digested biosolids to dryland winter wheat. Colorado Agricultural Experiment Station Technical Report. TR03-6.

Barbarick, K.A., J.A. Ippolito, and G.A. Peterson. 2004. Biosolids application to no-till dryland crop rotations. Colorado Agricultural Experiment Station Technical Report. TR04-4

Ippolito, J., K.A. Barbarick, and T. Gourd. 2004. Application of anaerobically digested biosolids to dryland winter wheat. Colorado Agricultural Experiment Station Technical Report. TR04-6.

Barbarick, K.A., J.A. Ippolito, and G.A. Peterson. 2005. Biosolids application to no-till dryland crop rotations. Colorado Agricultural Experiment Station Technical Report. TR05-6.

Ippolito, J., K.A. Barbarick, and T. Gourd. 2005. Application of anaerobically digested biosolids to dryland winter wheat. Colorado Agricultural Experiment Station Technical Report. TR05-10.

Barbarick, K.A., J.A. Ippolito, and N.C. Hansen. 2006. Biosolids application to no-till dryland crop rotations. Colorado Agricultural Experiment Station Technical Report. TR06-7.

Ippolito, J., K.A. Barbarick, and T. Gourd. 2006. Application of anaerobically digested biosolids to dryland winter wheat. Colorado Agricultural Experiment Station Technical Report. TR06-8.

Barbarick, K.A., J.A. Ippolito, and N.C. Hansen. 2007. Biosolids application to no-till dryland crop rotations. Colorado Agricultural Experiment Station Technical Report. TR07-10.

Ippolito, J., K.A. Barbarick, and T. Gourd. 2007. Application of anaerobically digested biosolids to dryland winter wheat. Colorado Agricultural Experiment Station Technical Report. TR07-12.

Barbarick, K.A., J.A. Ippolito, N.C. Hansen, and J. McDaniel. 2008. Biosolids application to no-till dryland crop rotations. Colorado Agricultural Experiment Station Technical Report. TR08-7.

Barbarick, K. 2008. Biosolids: A valuable fertilizer. *In* Making Better Decisions 2007 Colorado Winter Wheat variety Performance Trials. Colorado Agricultural Experiment Station Technical Report. TR08-8.

Barbarick, K.A. J.A. Ippolito, J., T. Gourd, and J. McDaniel. 2008. Application of anaerobically digested biosolids to dryland winter wheat. Colorado Agricultural Experiment Station Technical Report. TR08-9.

Barbarick, K.A., J.A. Ippolito, N.C. Hansen, and J. McDaniel. 2009. Biosolids application to no-till dryland crop rotations. Colorado Agricultural Experiment Station Technical Report. TR09-2.

Barbarick, K.A. J.A. Ippolito, J., T. Gourd, and J. McDaniel. 2009. Application of anaerobically digested biosolids to dryland winter wheat. Colorado Agricultural Experiment Station Technical Report. TR09-3.

Barbarick, K.A., J.A. Ippolito, N.C. Hansen, and J. McDaniel. 2010. Biosolids application to no-till dryland crop rotations. Colorado Agricultural Experiment Station Technical Report. TR10-4.

Barbarick, K.A. J.A. Ippolito, J., T. Gourd, and J. McDaniel. 2010. Application of anaerobically digested biosolids to dryland winter wheat. Colorado Agricultural Experiment Station Technical Report. TR10-5.

Barbarick, K.A., N.C. Hansen, and J. McDaniel. 2011. Biosolids application to no-till dryland crop rotations. Colorado Agricultural Experiment Station Technical Report. TR11-5.

Barbarick, K.A., T. Gourd, and J. McDaniel. 2011. Application of anaerobically digested biosolids to dryland winter wheat. Colorado Agricultural Experiment Station Technical Report. TR11-6.

Barbarick, K.A., N.C. Hansen, and J. McDaniel. 2012. Biosolids application to no-till dryland crop rotations. Colorado Agricultural Experiment Station Technical Report. TR12-6.

Barbarick, K.A., T. Gourd, and J. McDaniel. 2012. Application of anaerobically digested biosolids to dryland winter wheat. Colorado Agricultural Experiment Station Technical Report. TR12-8.

#### D. Non-technical papers

Barbarick, K. A. 1981. Nitrogen - its sources and transformation. Service-In-Action No. 550. Colorado State University Extension Service.

Barbarick, K. A., and D. G. Westfall. 1982. Fertilizer cost calculations. Service-In-Action No. 548. Colorado State University Extension Service.

Barbarick, K. A. 1982. Using organic materials as nitrogen fertilizers. Service-In-Action No. 546 Colorado State University, Extension Service.

Barbarick, K. A. 1988. Using organic materials as nitrogen fertilizers. Service-In-Action. No. 546, Colorado State University Cooperative Extension Service (Revision).

Barbarick, K. A., and D. G. Westfall. 1990. Fertilizer cost calculations. Service-In-Action No. 548 Colorado State University Extension Service. (Revision).

Gallier, W.T., R. Brobst, R. Aguillar, K.A. Barbarick, P. Hegeman, B. Janonis, D. Salahub, and S. Wilson. 1993.  $\text{L}$  for rangelands. Water Environment and Technology. 5(10):56-60.

Barbarick, K. A. 1994. Using organic materials as nitrogen fertilizers. Service-In-Action No. 546 Colorado State University, Extension Service. (Revision).

Barbarick, K.A., and D.G. Westfall. 1994. Biosolids recycling on crop- and rangeland. Service-In-Action No. 547. Colorado State University Extension Service.

Barbarick, K. A. 1996. Using organic materials as nitrogen fertilizers. Service-In-Action. No. 546, Colorado State University Cooperative Extension Service (Revision).

Barbarick, K., F. Katz, C. Roberts, S. Logsdon. 2008. The journal impact factor and the author h index: What are these mysterious numbers? Crops, Soils, Agronomy News 53(2):10-11.

Barbarick, K., C. Roberts, S. Logsdon. 2008. Getting the peers in peer review. Crops, Soils, Agronomy News 53(3):16.

### Professional Contributions Other Than Publications

Barbarick, K. A. 1974. An evaluation of undergraduate and graduate instruction. *Agronomy Abstracts*, p. 3.

Barbarick, K. A., A. W. Warrick, and D. F. Post. 1974. Percolation tests for septic tank suitability in southern Arizona soils. *Agronomy Abstracts*, p. 164.

Barbarick, K. A., and B. R. Sabey. 1977. Grade inflation at Colorado State University? Department of Agronomy's opinion. *Agronomy Abstracts*, p. 1.

Barbarick, K. A., A. Klute, and B. R. Sabey. 1979. Application of sewage effluent to soil columns of a mountain meadow soil - errors in calculating the flux of sodium. *Agronomy Abstracts*, p. 135.

Barbarick, K. A. 1980. Experiences with detailed course objectives in Introductory Soil Science. *NACTA Journal* 24(3):41-42.

Barbarick, K. A., B. R. Sabey, and N. A. Evans. 1981. Irrigation with effluent from a mountain community. In: *Water Forum '81, Vol. I* American Society of Civil Engineers. New York. pp. 624-629.

Simeoni, L. A., K. A. Barbarick, and B. R. Sabey. 1981. Effects of composting sewage sludge on plant uptake of heavy metals. *Agronomy Abstracts*, p. 34.

Barbarick, K. A. 1984. Computer assisted learning in Introductory Soil Science. *Agronomy Abstracts*, p. 1.

Utschig, J. M., K. A. Barbarick, R. H. Follett, and D. G. Westfall. 1984. Sewage sludge vs. nitrogen fertilization application on dryland winter wheat. *Agronomy Abstracts*, pp. 223-224.

Barbarick, K. A. 1985. Presentation to WI70 Regional Research Group on Chemistry in Bioavailability of Waste Constituents in Soil.

Barbarick, K. A., and A. Klute. 1985. Improving the presentation of the potential concept in Introductory Soil Science. *Agronomy Abstract*, p. 1.

Barbarick, K. A. 1986. Presentation to WI70 Regional Research Group on Chemistry and Bioavailability of Waste Constituents in Soil.

Eberl, D. D., T. M. Lai, and K. A. Barbarick. 1986. Mineral fertilizer based on ion exchange. *Am.*

Chem. Soc. Annual Meetings. Abstract.

Lai, T. M., D. D. Eberl, and K. A. Barbarick. 1986. A system to release nutrients through ion exchange:  $\text{NH}_4$ -zeolite-phosphate rock. *Agronomy Abstracts*, p. 205.

Barbarick, K. A. 1987. Presentation to W170 Regional Research Group on Chemistry and Bioavailability of Waste Constituents in Soil.

Barbarick, K. A., R. Lerch, J. M. Utschig, D. G. Westfall, R. H. Follett, T. M. McBride, and W. F. Owen. 1987. Application of municipal sewage sludge to dryland winter wheat. Waste Management Conference - Focus on the West. Fort Collins, CO.

Vaughan, B., D. G. Westfall, and K. A. Barbarick. 1987. Spring N recommendation model for dryland winter wheat. *Agronomy Abstracts*, p. 218.

Barbarick, K. A. 1988. Presentation to W170 Regional Research Group on Chemistry and Bioavailability of Waste Constituents in Soil.

Vaughan, B., D. G. Westfall, and K. A. Barbarick. 1988. Fall and spring N fertilization of dryland winter wheat. *Proceedings of Great Plains Soil Fertility Workshop*, 2:99-104.

Barbarick, K. A. 1988. Agricultural and industrial applications of zeolites. *Agronomy Abstracts*, p. 305.

Eberl, D. D., T. M. Lai, and K. A. Barbarick. 1988. Ion exchange fertilizers: controlled release of nutrients from mixtures of zeolite and phosphate rock. *Agronomy Abstracts*, p. 306.

Heil, D. M., and K. A. Barbarick. 1988. The influence of water treatment sludge on sorghum-sudangrass growth. *Agronomy Abstracts*, p. 39.

Barbarick, K. A. 1989. Presentation to W170 Regional Research Group on Chemistry and Bioavailability of Waste Constituents in Soils, Las Vegas, NV.

Barbarick, K. A. 1990. Invited seminar on Land Application of Sewage Sludge to the Hassan II Institute of Agriculture and Veterinary Medicine, Rabat, Morocco.

Barbarick, K. A. 1990. An environmental agronomy course. *Agron. Abstracts*, p. 3.

Lerch, R. N., K. A. Barbarick, P. Azari, L. E. Sommers, and D. G. Westfall. 1990. Extraction of sewage sludge proteins: Correlation to C and N mineralization of sludge-amended soil. *Agron. Abstracts*, p. 41.

Levy, D. B., K. A. Barbarick, E. G. Siemer, and L. E. Sommers. 1990. Heavy metal contamination in soils and plant species near Leadville, Colorado. *Agronomy Abstracts*, p. 41.

Barbarick, K. A. 1991. Presentation to W170 Regional Research Group on Chemistry and Bioavailability of Waste Constituents in Soils, Pac Forest, Washington.

Barbarick, K. A., and L. E. Sommers. 1991. Municipal waste as a fertilizer material Third Intermountain Meadow Symposium, Steamboat Springs, Colorado.

Sommers, L. E., K. A. Barbarick, and D. B. Levy. 1991. Behavior of trace metals in mountain meadow soils. Third Intermountain Meadow Symposium, Steamboat Springs, Colorado.

Lerch, R.N., and K.A. Barbarick. 1991. Characterization of sludge proteins and their degradation products. *Agron. Abstracts*, p. 270.

Barbarick, K.A. 1992. Presentation to W170 Regional Research Group on Chemistry and Bioavailability of waste constituents in soils, Las Vegas, NV.

Barbarick, K.A. 1992. Effective instruction in introductory courses. ACOP Western Region Teaching Symposium, Fort Collins, CO.

Barbarick, K.A. 1992. Undergraduate core curriculum in soil science. *Agron. Abstracts*. American Society of Agronomy. Madison, WI. p. 211.

Barbarick, K.A. 1993. Presentation to W170 Regional Research Group on Chemistry and Bioavailability of waste constituents in soils, Las Vegas, NV.

Ippolito, J.A., K.A. Barbarick, and E.F. Redente. 1993. Co-application of alum and sewage sludge to blue grama and western wheatgrass. *Agron. Abstracts*. American Society of Agronomy. Madison, WI. p. 36.

Barbarick, K.A. 1994. Presentation to W170 Regional Research Group on Chemistry and Bioavailability of waste constituents in soils, Las Vegas, NV.

Barbarick, K.A., J.A. Ippolito, and D.G. Westfall. 1994. Fate and mineralization of biosolids N applied to dryland wheat. *Agron. Abstracts*. American Society of Agronomy. Madison, WI. p. 36.

Ippolito, J.A., K.A. Barbarick, and E.F. Redente. 1994. Co-application of alum and sewage sludge to blue grama and western wheatgrass. *Agron. Abstracts*. American Society of Agronomy. Madison, WI. p. 36.

Barbarick, K.A. 1995 Presentation to W170 Regional Research Group on Chemistry and Bioavailability of waste constituents in soils, Las Vegas, NV.

Barbarick, K.A., J.A. Ippolito, D.G. Westfall, and R. Jepson. 1995. Eleven years of biosolids application to dryland winter wheat. pp. 2-1 to 2-8. *In* effects of Land Application of Biosolids in Arid and Semi-arid Environments. 16-19 May 1995, Colorado State University.

Ippolito, J.A., K.A. Barbarick, and E.F. Redente. 1995. Alum sludge and biosolids co-application: Metal uptake by roots/shoots of western wheatgrass. Agron. Abstracts. American Society of Agronomy. Madison, WI, P. 35.

Pierce, B.L., E.F. Redente, and K.A. Barbarick. 1995. Biosolids fertilization of a Colorado shrubland. pp. 3-1 to 3-19. *In* effects of Land Application of Biosolids in Arid and Semi-arid Environments. 16-19 May 1995, Colorado State University.

Redente, E.F., R.L. Harris-Pierce, and K.A. Barbarick. 1995. The effect of biosolids application on native shortgrass prairie vegetation and soils. pp. 3-1 to 3-10. *In* effects of Land Application of Biosolids in Arid and Semi-arid Environments. 16-19 May 1995, Colorado State University.

Bauder, T.A., K.A. Barbarick, and J.F. Shanahan. 1996. Influence of drilling-mud on the growth of sorghum-sudangrass. Agron. Abstracts. American Society of Agronomy. Madison, WI, P. 26.

Barbarick, K.A., J.A. Ippolito, D.G. Westfall. 1997.  $\text{NH}_4\text{HCO}_3$ -DTPA extractable trace elements to 150-cm depth in biosolids amended soils. Agron. Abstracts. American Society of Agronomy. Madison, WI, P. 31.

Barbarick, K.A. 1996 Presentation to W170 Regional Research Group on Chemistry and Bioavailability of waste constituents in soils, Las Vegas, NV.

Barbarick, K.A. 1997 Presentation to W170 Regional Research Group on Chemistry and Bioavailability of waste constituents in soils, Las Vegas, NV.

Barbarick, K.A. 1998 Presentation to W170 Regional Research Group on Chemistry and Bioavailability of waste constituents in soils, Las Vegas, NV.

Barbarick, K.A., and J.A. Ippolito. 1998. Mineralization rates for repeated biosolids application.

Ippolito, J.A., and K.A. Barbarick. 1999. A modified nitric acid plant tissue digest. Agron. Abstracts. American Society of Agronomy. Madison, WI, p. 30.

Barbarick, K.A. 2000 Presentation to W170 Regional Research Group on Chemistry and Bioavailability of waste constituents in soils, Las Vegas, NV.

Ippolito, J.A., and K.A. Barbarick. 2000. Phosphorus desorption from a water treatment residual. Agron. Abstracts. American Society of Agronomy. Madison, WI, p. 43.

Ippolito, J.A., and K.A. Barbarick. 2001. Water treatment residual phosphorus adsorption mechanisms. Agron. Abstracts. American Society of Agronomy. Madison, WI.

Barbarick, K.A. 2001 Presentation to W170 Regional Research Group on Chemistry and Bioavailability of waste constituents in soils, Las Vegas, NV.

Barbarick, K.A., and J.A. Ippolito. 2002. Does the number of hours studied affect exam performance? Agron. Abstracts. American Society of Agronomy. Madison, WI.

Green, C.H., K.A. Barbarick, G. Butters, D.M. Heil. 2002. The impact of vegetative filter strips and water treatment residuals on phosphorus runoff. Agron. Abstracts. American Society of Agronomy. Madison, WI.

Ippolito, J.A., and K.A. Barbarick. 2002. A simple C/N assay for Introductory Soil Science. American Society of Agronomy. Madison, WI.

Ippolito, J.A., and K.A. Barbarick. 2002. Phosphorus extraction methods from water treatment residual-amended soil. American Society of Agronomy. Madison, WI.

Barbarick, K.A. 2003 Presentation to W170 Regional Research Group on Chemistry and Bioavailability of waste constituents in soils, Las Vegas, NV.

Ippolito, J.A., and K.A. Barbarick. 2003. Soil phosphorus chemistry and testing. Nutrient Management Planning Update Workshop. Sponsored by CSU Cooperative Extension and the Natural Resources Conservation Service. February 11. Brighton, CO. Invited oral presentation.

Green, C.H., K.A. Barbarick, R.E. Smith, G.L. Butters, J.G. Davis, D.M. Heil, and J.A. Ippolito. 2003. Impact on phosphorus runoff and leaching by water treatment residuals and vegetative filter strips. Western Soil Science Meeting. San Francisco State University. June 15-19.

Lagae, H., K. Barbarick, and S. Davies. 2003. Soil organic matter - the missing piece of the productivity puzzle? Presentation at Western Agricultural Economics Association Annual Meeting. Denver, CO, July 14.

J. Ippolito and K. Barbarick. 2003. Co-application of WTR and biosolids to blue grama and



western wheatgrass. 2003 RMSAWWA/RMWEA Annual Conference. Casper, WY. September 14-17. Volunteered oral presentation.

Green, C.H., K.A. Barbarick, R.E. Smith, G.L. Butters, J.G. Davis, D.M. Heil, and J.A. Ippolito. 2003. Water treatment residual and vegetative filter strip impact on phosphorus runoff. Phosphorus dynamics I the soil-plant continuum. 2<sup>nd</sup> International Symposium. Perth, Australia, September 21-26. Volunteered oral presentation.

Al-Sheikh, A., J.A. Delgado, K.A. Barbarick, R. sparks, M. Dillon, Y. Qian, and G.E. Cardon. 2003. Mass balances and relationships between carbon, nitrogen, and phosphorus in high altitude coarse sandy soils. Agronomy Abstracts. American Society of Agronomy. Madison, WI.

Barbarick, K.A., and J.A Ippolito. 2003. Use of handheld moisture-measuring devices in Introductory Soil Science. Agronomy Abstracts. American Society of Agronomy. Madison, WI.

Green, C.H., K.A. Barbarick, R.E. Smith, G.L. Butters, J.G. Davis, D.M. Heil, J.A. Ippolito, and J. Loftis. 2003. Water treatment residual and vegetative filter strip effects on phosphorus runoff dynamics. Agronomy Abstracts. American Society of Agronomy. Madison, WI.

Ippolito, J.A., K.A. Barbarick, and C.H. Green. 2003. Can water treatment residuals adsorb selenium? Agronomy Abstracts. American Society of Agronomy. Madison, WI.

Barbarick, K.A., J.A. Ippolito, and G.A. Peterson. 2004. Biosolids application to no-till dryland cropping systems. Sustainable Land Application Conference. Lake Buena Vista, FL. January 4-8, 2004.

Brobst, R.B., V.F. Meyer, E.F. Redente, K.A. Barbarick, M.W. Paschke, A.L. Miller. 2004. Ecosystem responses to biosolids application following forest fire. Sustainable Land Application Conference. Lake Buena Vista, FL. January 4-8, 2004.

Brobst, R.B., V.F. Meyer, E.F. Redente, K.A. Barbarick, M.W. Paschke, A.L. Miller. 2004. Vegetation Responses to Biosolids Application Following Forest Fire. 18th Annual Residuals and Biosolids Management Conference. Water Environment Federation. Salt Lake City, UT, USA,. February 22-25, 2004.

Ippolito, J., R. Bayley, M. Stromberger, and K. Barbarick. 2004 The Effect of Long-Term Water Treatment Residuals/Biosolids Co-Application on Rangeland Soil Phosphorus RMSAWWA/RMWEA Joint Annual Conference. Grand Junction, CO. Sept. 12-15, 2004.

Freeman, C.L., J.A. Ippolito, K.A. Barbarick. 2004. Mobility and Fate of Metals in Long-Term biosolids Field Experiments. Agronomy Abstracts. American Society of Agronomy. Madison, WI.

Barbarick, K.A., and J.A. Ippolito. 2004. An Infiltration Exercise for Introductory Soil Science. Agronomy Abstracts. American Society of Agronomy. Madison, WI.

Bayley, R.M., J.A. Ippolito, M.E. Stromberger, and K.A. Barbarick. 2004. The Effect of Long-Term Water Treatment Residuals-Biosolids Co-Applications on Native Rangeland Soil Phosphorus. Agronomy Abstracts. American Society of Agronomy. Madison, WI.

Ippolito, J.A., and K.A. Barbarick. 2004. Effects of Long-Term Biosolids Application on soil carbon and nitrogen dynamics. Agronomy Abstracts. American Society of Agronomy. Madison, WI.

Ippolito, J., R. Bayley, M. Stromberger, and K. Barbarick. 2005. The effect of long-term water treatment residuals/biosolids co-application on rangeland soil phosphorus - Year 2. RMSAWWA/RMWEA Annual Conference. Sept. 11-14, 2005. Albuquerque, NM.

Ippolito, J., and K. Barbarick. 2005. A quarter century of biosolids research - Colorado State University. RMSAWWA/RMWEA Annual Conference. Sept. 11-14, 2005. Albuquerque, NM.

Barbarick, K., and J. Ippolito. 2005. Biosolids effect soil Ba in a dryland wheat agroecosystem. Poster #205-4. Agronomy Abstracts. American Society of Agronomy. Madison, WI.

Bayley, R., J. Ippolito, M. Stromberger, and K. Barbarick. 2005. Soil organic phosphorus characterized by indigenous enzyme assays. Poster #207-18. Agronomy Abstracts. American Society of Agronomy. Madison, WI.

Bayley, R., J. Ippolito, M. Stromberger, and K. Barbarick. 2005. The effect of long-term water treatment residuals-biosolids co-application on native rangeland soil phosphorus-year 2. Paper #302-6. Agronomy Abstracts. American Society of Agronomy. Madison, WI.

Ippolito, J., and K. Barbarick. 2005. Long-term impacts of biosolids rangeland surface application on trace metal mobility and fate. Paper #35-5. Agronomy Abstracts. American Society of Agronomy. Madison, WI.

Ippolito, J. E. Redente, and K. Barbarick. 2005. Amendment effects on pH and salt content of bauxite residue. Poster #141-5. Agronomy Abstracts. American Society of Agronomy. Madison, WI.

Ippolito, J.A., and K.A. Barbarick. 2006. Thirty five years of biosolids research in Colorado. Parker Ag Services Third Annual Client Appreciation Meeting. February 8. Denver, CO. Invited.

Ippolito, J.A., and K.A. Barbarick. 2006. Soil Science – The influence of biosolids.

Biosolids and Watershed Protection Workshop. June 7. Westminster, CO.

Lagae, H., K. Barbarick, S. Davies, and D. Lybecker. 2006. Municipal biosolids – Their economic value in dryland winter wheat-fallow cropping rotation. *J. Soil Water Cons.* 61(3): 191.

Barbarick, K.A. 2006. Student engagement strategies for introductory soil science. World Congress of Soil Science, Philadelphia, PA. **Invited Presentation.** Abstract and presentation number 26-2.

Ippolito, J.A. and K.A. Barbarick. 2006. Biosolids land application – A phosphorus based agronomic approach. RMSAWWA/RMWEA Annual Conference. September 11-13. Vail, CO.

Ippolito, J.A. and K.A. Barbarick. 2006. Biosolids land application – Do biosolids trace metals move within soils? RMSAWWA/RMWEA Annual Conference. September 11-13. Vail, CO.

McDaniel, J., J. Ippolito, and K. Barbarick. 2006. Phosphorus release from water treatment residuals-biosolids co-amended soils. Paper #11-1. *Agronomy Abstracts.* American Society of Agronomy. Madison, WI.

Ippolito, J., K. Barbarick, and M. Paschke. 2006. Long-term water treatment residuals-biosolids co-application affects rangeland soils and plants. Paper #124-11. *Agronomy Abstracts.* American Society of Agronomy. Madison, WI.

Ippolito, J., K. Barbarick, and M. Paschke. 2006. Long-term composted biosolids affects rangeland soils and plants. Paper #127-8. *Agronomy Abstracts.* American Society of Agronomy. Madison, WI.

Ippolito, J., K. Barbarick, and K. Norvell. 2006. Biosolids impact soil phosphorus recovery, fractionation and potential risk. Paper #307-1. *Agronomy Abstracts.* American Society of Agronomy. Madison, WI.

Ippolito, J.A., K.A. Barbarick, and M.W. Paschke. 2007. Long-Term Composted Biosolids Land Application Affects Rangeland Soils and Plants. A “TOWN HALL” MEETING: Where is the Prairie Growing? 2007 Shortgrass Steppe Symposium Lory Student Center, Colorado State University Thursday, January 11, 2007.

Ippolito, J.A., M.W. Paschke, and K.A. Barbarick. 2007. Long-term composted biosolids land application affects rangeland soils and plants. 2007 Shortgrass Steppe Symposium. January 11. Fort Collins, CO.

Barbarick, K.A. 2008. Presentation to W170 Regional Research Group on Chemistry and

Bioavailability of waste constituents in soils, Las Vegas, NV.

Ippolito, J., K. Scheckel, and K. Barbarick. 2008. Selenium-Water Treatment Residual Adsorption and Characterization. GSA-ASA-CSSA-SSSA Abstracts: 707-1.

Barbarick, K.A. 2009. Presentation to W170 Regional Research Group on Chemistry and Bioavailability of waste constituents in soils, Las Vegas, NV.

Barbarick, K.A. 2009. Crossword puzzles as learning tools in Introductory Soil Science. Paper #136-2. Agronomy Abstracts. American Society of Agronomy. Madison, WI.

McDaniel, J., M. Stromberger, and K. Barbarick. 2010. Microbial biomass and nitrogen cycling as affected by *A. Trapezoides* in a Colorado soil. American Society of Agronomy Abstract 103-7.

McDaniel, J., G.L. Butters, M. Stromberger, and K. Barbarick. 2011. Earthworm effects on solute leaching in a biosolids amended soil. Soil Science Society of America Abstract 391-6.

McDaniel, J., K. Barbarick, and M. Stromberger. 2012. Drought Stress Affects Earthworms in a Biosolids Amended Colorado Soil. Soil Science Society of America Abstract 389-7.

Numerous presentations have been made for the U.S. EPA at public hearings, and at Colorado Senate committee hearings and Colorado State University Wheat Field Days.

**Contract and Grant Activity**

I have had a continuous agreement with the cities of Littleton and Englewood Wastewater Treatment Plant since 1982. Assuming an average of \$35,000 per year over the 26-year period, they have funded our research at over \$1 million. Some of the early years’ budgets (1979-1988) are not currently available. Contract and Grant Activity is listed below beginning with the most recent funding.

<b>Years</b>	<b>Funding Source</b>	<b>Amount</b>
2008	Littleton and Englewood Wastewater Treatment Plant	\$102,077
2007	Littleton and Englewood Wastewater Treatment Plant	84,125
	Denver Metro Wastewater	35,864
	Master Teacher Initiative	1,000
2006	Littleton and Englewood Wastewater Treatment Plant	73,568
	Denver Metro Wastewater	45,662
	Master Teacher Initiative	1,000
2005	Littleton and Englewood Wastewater Treatment Plant	79,929
	American Water Works Association Research Foundation	147,137
	US Environmental Protection Agency Region 8	85,998
	US Environmental Protection Agency Region 8	97,843
	USDA Western Region Excellence in Teaching Award	2,000
2004	Littleton and Englewood Wastewater Treatment Plant	78,851
2003	Littleton and Englewood Wastewater Treatment Plant	75,855
	US Environmental Protection Agency Region 8	64,500
2002	Littleton and Englewood Wastewater Treatment Plant	70,114
2001	Littleton and Englewood Wastewater Treatment Plant	67,085
2000	Littleton and Englewood Wastewater Treatment Plant	62,424
1999	Littleton and Englewood Wastewater Treatment Plant	64,790
1998	Littleton and Englewood Wastewater Treatment Plant	64,588
1997	Littleton and Englewood Wastewater Treatment Plant	61,004
1996	Littleton and Englewood Wastewater Treatment Plant	65,640
1995	Littleton and Englewood Wastewater Treatment Plant	62,410
	Synder Oil Company	45,456
	Colorado Department of Public Health and Environment	50,000
1994	Littleton and Englewood Wastewater Treatment Plant	63,109
	City of Fort Collins	14,976
1993	Littleton and Englewood Wastewater Treatment Plant	59,388
	City of Fort Collins	64,656
1992	Littleton and Englewood Wastewater Treatment Plant	55,019
1991	Littleton and Englewood Wastewater Treatment Plant	50,637

1990	Littleton and Englewood Wastewater Treatment Plant	50,019
	US Geological Survey	9,000
1989	Littleton and Englewood Wastewater Treatment Plant	44,236
	US Geological Survey	7,000

## CONSULTING ACTIVITIES

<u>Agency</u>	<u>Activity</u>
Taranto, Stanton, and Tagge	Wastewater application to a mountain meadow - Hayden, CO
Cities of Littleton and Englewood, CO	Application of sewage biosolids to dryland winter wheat
Inverness Water District, CO	Wastewater application to a golf course
City of Wray, CO	Wastewater application to a pasture
City of Boulder, CO	Land application of fresh-water treatment sludge (alum) to a revegetated area
Richard P. Archer and Assoc.	Land application of sewage biosolids - Boulder, CO
Hammond, Clark, and White Law Firm	Molasses spill at Ward Industrial Park; effects on soils and landscaping plants
Weld County, CO	Application of National Hog Farm waste to rangeland
RBD, Inc.	Land application of sewage biosolids, compost, and biosolids plus fresh-water treatment sludge to rangeland
City of Lafayette, CO	Effects of wastewater on crop production
N-Viro	Land application of N-Viro Soil to corn
BHP, International	Mineral fertilizer development
Wright Water Engineers, Waste and Water Engineering	Application of National Hog Farm waste to rangeland