

## Jeffrey R. Seemann

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### Education:

1983-1984	Postdoctoral Fellow	Department of Plant Biology Carnegie Institution of Washington Stanford, California
1982-1983	Postdoctoral Fellow	Australian National University Canberra, Australia
1982	Ph.D., Biological Sciences	Stanford University Stanford, California
1977	B.A. with honors, Biology	Oberlin College Oberlin, Ohio

### Academic Appointments:

2001-present	Dean	College of the Environment and Life Sciences University of Rhode Island
2001-present	Director	RI Agricultural Experiment Station University of Rhode Island
2001-present	Director	RI Cooperative Extension University of Rhode Island
2001-present	Professor	Department of Cell and Molecular Biology University of Rhode Island
1997-2004	Adjunct Senior Research Scientist	Lamont-Doherty Earth Observatory Columbia University

**Academic Appointments: cont'd.**

1992-2001	Professor	Department of Biochemistry University of Nevada, Reno
1990-2001	Chair	Department of Biochemistry College of Agriculture, Biotechnology and Natural Resources/ School of Medicine University of Nevada, Reno
1989-1991	Chair	Department of Plant Science College of Agriculture University of Nevada, Reno
1987-1992	Associate Professor	Department of Biochemistry University of Nevada, Reno
1984-1987	Assistant Research Professor	Biological Sciences Center Desert Research Institute, Reno University of Nevada System

**Honors and Awards:**

2004	Workforce Development Award	RI Technology Council
2003	Highly Cited Researcher	Current Contents, ISI
1991	College of Ag Outstanding Researcher	University of Nevada, Reno
1989	Gamma Sigma Delta	University of Nevada, Reno
1987	Who's Who in the West	
1986	Visiting Research Fellowship	Australian National University
1983-1984	McKnight Foundation Fellowship	Carnegie Institution
1977	Botanical Society of America	Travel Award
1977-1982	Biology Fellowship	Stanford University
1977	Sigma Xi	Oberlin College
1976-1977	Honors Research Program	Oberlin College

**Membership in Societies:**

American Association for the Advancement of Science  
American Society of Plant Biologists

**Professional Activities:**

Ad Hoc Grant Reviewer - NSF, USDA-CRGO/NRI, DOE (multiple programs for all), BARD

Ad Hoc Journal Reviewer - Nature, Planta, Plant Physiology, Physiologia Plantarum, Australian Journal of Plant Physiology, Plant Physiology and Biochemistry, Crop Science, FEBS Letters, Canadian Journal of Botany, Ecology, Journal of Experimental Botany, Photosynthesis Research, Journal of Biological Chemistry, PNAS, Plant Cell and Environment, Global Change Biology

Member, Environmental Stress Program Grant Review Panel, Competitive Research Grants Office, USDA, 1988

Member, Editorial Board of Plant Physiology, 1989-1992

Member, Photosynthesis Program Grant Review Panel, Competitive Research Grants Office, USDA, 1990

Member, NSF Directorate for Biological, Behavioral and Social Sciences RTG Site Review Committee, 1991

Participant, 1<sup>st</sup> SAES/ESCOP Leadership Development Course, 1991-1992

Member, Plant Responses to Environment Program Grant Review Panel, National Research Initiative Competitive Grants Office, USDA, 1992

Ad hoc member, CSRS Western Region Regional Research Implementation Committee, 1992

Administrative Advisor, USDA Regional Project WRCC-85, "Molecular Detection of Phytopathogens", 1992-1996

Member, Integrative Plant Biology Program Grant Review Panel, National Science Foundation, 1994-1997

Principal Investigator, Nevada Desert FACE Facility, 1995-2001

Member, Science Advisory Committee, Biosphere 2/Columbia University, 1995-1996

Director, Nevada NSF EPSCoR Program, 1997-1998

Member, Plant Responses to Environment Program Grant Review Panel, National Research Initiative Competitive Grants Office, USDA, 1999

**Professional Activities: cont'd.**

Member, Board of Directors, Slater Center for Environmental Biotechnology, Economic Policy Council, State of Rhode Island, 2001- 2002

Chair, Board of Directors, Slater Center for Marine and Environmental Technology, Samuel Slater Technology Fund, Economic Development Corporation, State of Rhode Island, 2002-2005

Member/Chair, Administrative Heads Section Subcommittee on "Science on the Hill" Exhibit, NASULGC, 2001-2003

Liaison, Northeast Regional Association of Experiment Station Directors to Board of Governors and Executive Board, USDA Northeast Regional Aquaculture Center, 2001-2003

Administrative Advisor, USDA Regional Project NE-187, "Best Management Practices for Turf Systems in the East", 2001-2003

Member, Executive Board, University of Rhode Island Transportation Center, 2001-2004

Member, Advisory Board, Rhode Island Natural History Survey, 2001-present

Member, Lt. Governor's (RI) Emergency Management Advisory Council Domestic Preparedness Subcommittee, 2002-present

Member, RI Department of Health Biomonitoring Scientific Advisory Board, 2002-2004

Member, Executive Committee, Northeast Regional Association of Experiment Station Directors, 2002-2006

Chair, Northeast Administrative Heads Section, NASULGC, 2003-2005

Member, ESCOP Partnership Committee, 2003-2004

Project Director, Rhode Island NSF EPSCoR Program, 2003-present

Member, Tech Collective (formerly Rhode Island Technology Council) Board of Directors, 2004-2005

Founding Chair, BioGroup, RI Life Sciences Consortium (subsidiary of Tech Collective), 2004-2005

Member, Governor's Blue Ribbon Panel on Science and Mathematics Education (appointed by Governor), 2004-2006

Chair, Administrative Heads Section, NASULGC, 2006-2007

**Professional Activities: cont'd.**

Member, Slater Technology Fund Board of Directors, Economic Development Corporation, State of Rhode Island (appointed by Governor), 2005-present

Co-Chair, Rhode Island Science and Technology Advisory Council (appointed by Governor), 2005-present

**Full Courses Taught (University of Nevada, Reno):**

Biochemistry 121 - Current Topics in Biochemistry and Molecular Biology

Biology 330 - Plant Biology

Biology 355 - Plant Physiology

Biochemistry 412/612 - Plant Biochemistry

Biochemistry 420, 421 - Critical Skills in Biochemistry and Molecular Biology

Biochemistry 718 - Plant Metabolism

**Full Courses Taught (University of Rhode Island)**

URI 101 – First Year Experience for Undergraduates

**Research Interests:**

1. Physiology, biochemistry, and molecular biology of photosynthetic carbon metabolism, and particularly regulation of ribulose-1,5-bisphosphate carboxylase/oxygenase.
2. Ecophysiology and biochemistry of photosynthetic responses and adaptations to environment, including light, salinity, temperature, water deficits, and nitrogen availability.
3. Plant responses to global change, including molecular- through ecosystem-level responses to rising atmospheric CO<sub>2</sub>.

**Publications:**

1. Benzing, D.H., J. Seemann, and A. Renfrow (1978) The foliar epidermis in Tillandsioidae (Bromeliaceae) and its role in habitat selection. *American Journal of Botany* 65:359-365.
2. Benzing, D.H. and J. Seemann (1978) Nutritional piracy and host decline: a new perspective on the epiphyte-host relationship. *Selbyana* 2:133-148.
3. Chiariello, N., C. Field, H.A. Mooney, and J. Seemann (1980) Architecture and thermal relations of *Veratrum californicum* (Liliaceae), a snowbank emergent. *Madrono* 27(3):113-121.

**Publications: cont'd.**

4. Ball, J.T., J. Keeley, H. Mooney, J. Seemann and W. Winner (1983) Relationship between form, function and distribution of two *Arctostaphylos* species (Ericaceae) and their putative hybrids. *Oecologia Plantarum* 4:153-164.
5. Seemann, J.R., M.R. Badger, and J.A. Berry (1984) Variation in the specific activity of RuBP carboxylase between species utilizing different photosynthetic pathways. *Plant Physiology* 74:791-794.
6. Downton, W.J.S., J.A. Berry, and J.R. Seemann (1984) Tolerance of photosynthesis to high temperature in desert plants. *Plant Physiology* 74:786-790.
7. Evans, J.R. and J.R. Seemann (1984) Differences between wheat genotypes in specific activity of RuBP carboxylase and the relationship to photosynthesis. *Plant Physiology* 74:759-765.
8. Seemann, J.R., J.A. Berry and W.J.S. Downton (1984) Photosynthetic response and adaptation to high temperature in desert plants. A comparison of gas exchange and fluorescence methods for studies of thermal tolerance. *Plant Physiology* 75:364-368.
9. Seemann, J.R. and C. Critchley (1985) Effects of salt stress on the growth, ion content, stomatal behaviour and photosynthetic capacity of a salt-sensitive species, *Phaseolus vulgaris* (L.). *Planta* 164:151-162
10. Seemann, J.R., J.A. Berry, S.M. Freas and M.A. Krump (1985) Regulation of ribulose biphosphate carboxylase activity *in vivo* by a light modulated inhibitor of catalysis. *Proceedings of the National Academy of Sciences (USA)* 82:8024-8028.
11. Seemann, J.R., W.J.S. Downton and J.A. Berry (1986) Temperature and leaf osmotic potential as factors in the acclimation of photosynthesis to high temperature in desert plants. *Plant Physiology* 80:926-930.
12. Sharkey, T.D., J.R. Seemann and J.A. Berry (1986) Regulation of ribulose-1,5-bisphosphate carboxylase in response to changing partial pressure of O<sub>2</sub> and light in *Phaseolus vulgaris*. *Plant Physiology* 81:788-791.
13. Seemann, J.R. and T.D. Sharkey (1986) Salinity and nitrogen effects on photosynthesis, ribulose 1,5-bisphosphate carboxylase and metabolite pool sizes in *Phaseolus vulgaris* L. *Plant Physiology* 82:555-560.
14. Sharkey, T.D., J.R. Seemann and R.W. Percy (1986) The contribution of metabolites to post-illumination CO<sub>2</sub> assimilation in response to lightflecks. *Plant Physiology* 82:1063-1068.

**Publications: cont'd.**

15. Seemann, J.R. (1986) Mechanisms for the regulation of CO<sub>2</sub> fixation by ribulose-1,5-bisphosphate carboxylase. In: R. Marcelle, H. Clijsters, M. Van Poucke (eds.) *Biological Control of Photosynthesis.*, Martinus Nijhoff Publishers, Dordrecht, Netherlands, pp 71-82.
16. Berry, J., G. Lorimer, J. Pierce, J. Seemann, J. Meeks and S. Freas (1987) Isolation, identification and synthesis of 2-carboxyarabinitol-1-phosphate, a diurnal regulator of ribulose bisphosphate carboxylase activity. *Proceedings of the National Academy of Sciences (USA)* 84:734-738.
17. Seemann, J.R., T.D. Sharkey, J.L. Wang and C.B. Osmond (1987) Environmental effects on photosynthesis, nitrogen use efficiency, and metabolite pools in leaves of sun and shade plants. *Plant Physiology* 84:796-802.
18. Seemann, J.R. and T.D. Sharkey (1987) The effect of abscisic acid and other inhibitors on photosynthetic capacity and the biochemistry of CO<sub>2</sub> assimilation. *Plant Physiology* 84:696-700.
19. Sage, R.F., R.W. Pearcy and J.R. Seemann (1987) The nitrogen use efficiency of C<sub>3</sub> and C<sub>4</sub> plants. III. Leaf nitrogen effects on the activity of carboxylating enzymes in *Chenopodium album* (L.) and *Amaranthus retroflexus* (L.). *Plant Physiology* 85:355-359.
20. Sharkey, T.D., J. Kobza, J.R. Seemann and R.H. Brown (1988) Reduced cytosolic fructose-1,6-bisphosphatase activity leads to loss of O<sub>2</sub> sensitivity in a *Flaveria linearis* mutant. *Plant Physiology* 86:667-671.
21. Kobza, J. and J.R. Seemann (1988) Mechanisms for light-dependent regulation of ribulose-1,5-bisphosphate carboxylase activity and photosynthesis in intact leaves. *Proceedings of the National Academy of Sciences (USA)* 85:3815-3819.
22. Sage, R.F., T.D. Sharkey and J.R. Seemann (1988) The *in vivo* response of the ribulose 1,5-bisphosphate carboxylase activation state and the pool sizes of photosynthetic metabolites to elevated CO<sub>2</sub> in *Phaseolus vulgaris* L. *Planta* 174:407-416.
23. Seemann, J.R., J.Kobza (1988) Genetic variation in the regulation of ribulose 1,5-bisphosphate carboxylase activity. *Plant Physiology and Biochemistry* 26:461-471.
24. Seemann, J.R., M.U.F. Kirschbaum, T.D. Sharkey and R.W. Pearcy (1988) Regulation of ribulose-1,5-bisphosphate carboxylase activity in *Alocasia macrorrhiza* in response to step changes in irradiance. *Plant Physiology* 88:148-152

**Publications: cont'd.**

25. Kobza, J. and J.R. Seemann (1989) Light-dependent kinetics of 2-carboxyarabinitol 1-phosphate metabolism and ribulose-1,5-bisphosphate carboxylase activity *in vivo*. *Plant Physiology* 89:174-179
26. Sage, R.F., T.D. Sharkey and J.R. Seemann (1989) The acclimation of photosynthesis to elevated CO<sub>2</sub> in five C<sub>3</sub> species. *Plant Physiology* 89:590-596.
27. Kobza, J. and J.R. Seemann (1989) Regulation of ribulose-1,5-bisphosphate carboxylase activity during diurnal changes in irradiance. *Plant Physiology* 89:918-924.
28. Sharkey, T.D. and J.R. Seemann (1989) Mild water stress effects on carbon-reduction-cycle intermediates, ribulose bisphosphate carboxylase activity, and spatial homogeneity of photosynthesis in intact leaves. *Plant Physiology* 89:1060-1065.
29. Seemann, J.R. (1989) Light adaptation/acclimation of photosynthesis and the regulation of ribulose-1,5-bisphosphate carboxylase activity in sun and shade plants. *Plant Physiology* 91:379-386.
30. Kobza, J., B.d. Moore and J.R. Seemann (1989) Isolation of photosynthetically active protoplasts and chloroplasts from *Phaseolus vulgaris*. *Plant Science* 65:177-182.
31. Evans, J.R. and J.R. Seemann (1989) The allocation of protein nitrogen in the photosynthetic apparatus: costs, consequences, and control. In: W.R. Briggs (ed), *Photosynthesis*, Alan R. Liss Press, pp 183-205.
32. Seemann, J.R., J. Kobza and B.d. Moore (1990) Metabolism of 2-carboxyarabinitol 1-phosphate and regulation of ribulose-1,5-bisphosphate carboxylase activity. *Photosynthesis Research* 23:119-130.
33. Ziska, L.H., J.R. Seemann and T.M. DeJong (1990) Salinity induced limitations on photosynthesis in *Prunus salicina*, a deciduous tree species. *Plant Physiology*, 93:864-870.
34. Pearcy R.W., J.R. Seemann (1990) The photosynthetic induction state of leaves in a soybean canopy in relation to light regulation of ribulose-1,5-bisphosphate carboxylase and stomatal conductance. *Plant Physiology*, 94:628-633.
35. Moore, B.d. and J.R. Seemann (1990) <sup>14</sup>CO<sub>2</sub> labelling studies of 2-carboxyarabinitol 1-phosphate synthesis. *Plant Cell Physiology* 31:969-974.
36. Sage, R.F., T.D. Sharkey, J.R. Seemann (1990) Regulation of ribulose-1,5-bisphosphate carboxylase activity in response to light intensity and CO<sub>2</sub> in the C<sub>3</sub> annuals *Chenopodium album* L. and *Phaseolus vulgaris* L. *Plant Physiology* 94:1735-1742.

**Publications: cont'd.**

37. Winicov, I., J.R. Seemann (1990) Expression of genes for photosynthesis and the relationship to salt tolerance of alfalfa (*Medicago sativa*) cells. *Plant Cell Physiology* 31:1155-1161.
38. Cramer, G.R., R. Abdel-Basset, J.R. Seemann (1990) Salinity-calcium interactions on root growth and osmotic adjustment of two corn cultivars differing in salt tolerance. *Journal of Plant Nutrition*, 11:1453-1462.
39. Moore, B.d., J. Kobza, J.R. Seemann (1991) Measurement of 2-carboxyarabinitol 1-phosphate in plant leaves by isotope dilution. *Plant Physiology* 96:208-213.
40. Shirzadegan, M., P. Christie, J.R. Seemann (1991) An efficient method for isolation of RNA from tissue cultured plant cells. *Nucleic Acids Research* 19:6055.
41. Pons, T.L., R.W. Percy, J.R. Seemann (1992) Photosynthesis in flashing light in soybean leaves grown in different conditions. 1. Photosynthetic induction state and regulation of ribulose-1,5-bisphosphate carboxylase activity. *Plant, Cell and Environment* 15:569-576.
42. Moore, B.d., T.D. Sharkey, J. Kobza, J.R. Seemann (1992) Identification and levels of 2'-carboxyarabinitol in leaves. *Plant Physiology* 99:1546-1550.
43. Moore, B.d., J.R. Seemann (1992) Metabolism of 2'-carboxyarabinitol in leaves. *Plant Physiology* 99:1551-1555.
44. Sage, R.F., J.R. Seemann (1993) Regulation of ribulose-1,5-bisphosphate carboxylase/oxygenase activity in response to reduced light intensity in C<sub>4</sub> plants. *Plant Physiology* 102:21-28.
45. Moore, B.d., E. Isidoro, J.R. Seemann (1993) Distribution of 2-carboxyarabinitol among plants. *Phytochemistry* 34:703-707.
46. Sage, R.F., C.T. Reid, B.d. Moore, J.R. Seemann (1993) Long-term kinetics of the light-dependent regulation of ribulose-1,5-bisphosphate carboxylase/oxygenase activity in plants with and without 2-carboxyarabinitol 1-phosphate. *Planta* 191:222-230.
47. Moore, B.d., J.R. Seemann (1994) Evidence that 2-carboxyarabinitol 1-phosphate binds to ribulose bisphosphate carboxylase *in vivo*. *Plant Physiology* 105:731-737.
48. Moore, B.d., M. Hackett, J.R. Seemann (1995) Hamamelitol purification, identification by electrospray ionization mass spectrometry, and quantification in plant leaves. *Planta* 195:418-425.

**Publications: cont'd.**

49. Moore, B.d., O. Kiirats, T. Charlet, J.R. Seemann (1995) Levels of carboxyarabinitol 1-phosphate and related photosynthetic compounds during leaf development in *Phaseolus vulgaris*. *Plant and Cell Physiology* 36:1097-1103.
50. Moore, B.d., T.D. Sharkey, J.R. Seemann (1995) Intracellular localization of CA1P and CA1P phosphatase activity in leaves of *Phaseolus vulgaris* L. *Photosynthesis Research* 45:219-224.
51. Griffin, K.L., P.D. Ross, D.A. Sims, Y. Luo, J.R. Seemann, C.A. Fox, J.T. Ball (1996) EcoCells: A tool for mesocosm scale measurements of gas exchange. *Plant, Cell and Environment* 19:1210-1221.
52. Griffin, K.L. and J.R. Seemann (1996) Plants, CO<sub>2</sub> and photosynthesis in the 21<sup>st</sup> century. *Chemistry and Biology* 3:245-254.
53. Charlet, T., B.d. Moore, J.R. Seemann (1997) CA1P phosphatase from leaves of *Phaseolus vulgaris* and other species. *Plant Cell Physiology* 38: 511-517.
54. Moore, B.d., J.N. Talbot, J.R. Seemann (1997) Function of leaf hamamelitol as a compatible solute during water-stress treatment of *Hedera helix* L. *Plant, Cell and Environment* 20:938-944.
55. Moore, B.d., D.E. Palmquist, J.R. Seemann (1997) Influence of plant growth at high CO<sub>2</sub> concentrations on leaf content of ribulose 1,5-bisphosphate carboxylase/oxygenase and intracellular distribution of soluble carbohydrates in tobacco, snapdragon, and parsley. *Plant Physiology* 115:241-248.
56. Gibeaut, D.M., J. Hulett, G.R. Cramer, J.R. Seemann (1997) Maximal biomass of *Arabidopsis thaliana* using a simple, low maintenance hydroponic method and favorable environmental conditions. *Plant Physiology* 115:317-319.
57. Sims, D., J.R. Seemann, Y. Luo (1998) The significance of differences in the mechanisms of photosynthetic acclimation to light, nitrogen, and CO<sub>2</sub> for return on investment in leaves. *Functional Ecology* 12:185-194.
58. Cheng, S-H and J.R. Seemann (1998) Extraction and purification of RNA from plant tissue enriched in polysaccharides. In: *Methods in Molecular Biology, Vol. 86: RNA Isolation and Characterization Protocols*. R Rapley and DL Manning (eds). Humana Press Inc., Totowa, NJ, pp 27-32.
59. Sims, D., J.R. Seemann, Y. Luo (1998) Elevated CO<sub>2</sub> concentration has independent effects on expansion rates and thickness of soybean leaves across light and nitrogen gradients. *Journal of Experimental Botany* 49:583-591.

**Publications: cont'd.**

60. Cheng, S., B.d. Moore, J.R. Seemann (1998) Effects of short- and long-term growth at elevated CO<sub>2</sub> on the expression of Rubisco genes and leaf carbohydrate accumulation in *Arabidopsis thaliana* (L.) Heynh. *Plant Physiology* 116:715-723.
61. Cheng, S., B.d. Moore, J.R. Seemann (1998) Purification of RNA from leaf carbohydrates in plants exposed to elevated atmospheric CO<sub>2</sub>. In: *Methods in Molecular Biology*, R Rapley and DL Manning (eds). Humana Press Inc., Totowa, NJ.
62. Sims, D., Y. Luo, J.R. Seemann (1998) Comparison of photosynthetic acclimation to elevated CO<sub>2</sub> and limited nitrogen supply in soybean. *Plant Cell and Environment* 21:945-952.
63. Moore, B.d., S-H. Cheng, J. Rice, J.R. Seemann (1998) Sucrose cycling, rubisco expression, and prediction of photosynthetic acclimation to elevated CO<sub>2</sub>. *Plant, Cell and Environment* 21:905-915.
64. Huxman, T.E., E.P. Hamerlynck, Bd Moore, S.D. Smith, D.N. Jordan, S.F. Zitzer, R.S. Nowak, J.S. Coleman, J.R. Seemann (1998) Photosynthetic down-regulation in *Larrea tridentata* exposed to elevated atmospheric CO<sub>2</sub>: Interactions with drought under glasshouse and field (FACE) exposure. *Plant Cell and Environment* 21:1153-1161.
65. Sims D., Y. Luo, J.R. Seemann (1998) Importance of leaf versus whole plant CO<sub>2</sub> environment for photosynthetic acclimation. *Plant, Cell and Environment* 21:1189-1196.
66. Griffin K.L., D.A. Sims, J.R. Seemann (1999) Altered nighttime CO<sub>2</sub> concentration affects the growth, physiology and biochemistry of soybean. *Plant, Cell and Environment* 22:91-99.
67. Moore, B.d., S-H. Cheng, D. Sims, Seemann, J.R. (1999) *Invited Review: The biochemical and molecular basis for photosynthetic acclimation to elevated atmospheric CO<sub>2</sub>*. *Plant, Cell and Environment (Special Issue on Rising CO<sub>2</sub> Concentration)* 22:567-582.
68. Jordan D.N., S.F. Zitzer, G.R. Hendrey, K.F. Lewin, J. Nagy, R.S. Nowak, S.D. Smith, J.S. Coleman, J. R. Seemann (1999) Biotic, abiotic and performance aspects of the Nevada Desert Free-Air CO<sub>2</sub> Enrichment (FACE) Facility. *Global Change Biology* 5:659-668.
69. Sims D.A., W. Cheng, Y. Luo, J.R. Seemann (1999) Photosynthetic acclimation to elevated CO<sub>2</sub> in a sunflower canopy. *Journal of Experimental Botany* 50:645-653.

**Publications: cont'd.**

70. Hamerlynck, EP, TE Huxman, RS Nowak, S Redar, ME Loik, DN Jordan, SF Zitzer, JS Coleman, JR Seemann, SD Smith (2000) Photosynthetic responses of *Larrea tridentata* to a step-increase in atmospheric CO<sub>2</sub> at the Nevada Desert FACE Facility. *Journal of Arid Environments* 44:425-436.
71. Yoder, CK, P Vivin, LA DeFalco, JR Seemann, RS Nowak (2000) Root growth and function of three Mojave Desert grasses in response to elevated atmospheric CO<sub>2</sub> concentration. *New Phytologist* 145:245-256.
72. Taub, DR., JR Seemann, JS Coleman (2000) Growth in elevated CO<sub>2</sub> protects photosynthesis against high temperature damage. *Plant, Cell and Environment* 23:649-656.
73. Pataki, DE, TE Huxman, DN Jordan, SF Zitzer, JS Coleman, SD Smith, RS Nowak, JR Seemann (2000) Water use of two Mojave Desert shrubs under elevated CO<sub>2</sub>. *Global Change Biology* 6:889-897.
74. Smith, SD, TE Huxman, SF Zitzer, TN Charlet, DC Houseman, JS Coleman, LK Fenstermaker, JR Seemann, RS Nowak (2000) Elevated CO<sub>2</sub> increases productivity and invasive species success in an arid ecosystem. *Nature* 408:79-82.
75. Nowak, RS, LA DeFalco, CS Wilcox, DN Jordan, JS Coleman, JR Seemann, SD Smith (2001) Leaf conductance decreased under free-air CO<sub>2</sub> enrichment (FACE) for three perennials in the Nevada Desert. *New Phytologist* 150:449-458.
76. Gibeaut, DM, GR Cramer, JR Seemann (2001) Growth, cell walls and UDP-Glc dehydrogenase activity of *Arabidopsis thaliana* grown in elevated carbon dioxide. *Journal of Plant Physiology* 158:569-576.
77. Griffin, KL, OR Anderson, MD Gastrich, JD Lewis, G Lin, W Schuster, JR Seemann, DT Tissue, MH Turnbull, D Whitehead (2001) Plant growth in elevated CO<sub>2</sub> alters mitochondrial number and chloroplast fine structure. *Proceedings of the National Academy of Sciences (USA)* 98:2473-2478.
78. Wang, X, JD Lewis, DT Tissue, JR Seemann, KL Griffin (2001) Effects of elevated atmospheric CO<sub>2</sub> concentration on leaf respiration of *Xanthium strumarium* in light and in darkness. *Proceedings of the National Academy of Sciences (USA)* 98:2479-2484.
79. Nowak, RS, SF Zitzer, D Babcock, V Smith-Longozo, TN Charlet, JS Coleman, JR Seemann, SD Smith (2004) Elevated CO<sub>2</sub> does not conserve soil water in the Mojave Desert. *Ecology* 85:93-99.

**Publications: cont'd.**

80. Zou, X, JR Seemann, D Neuman, QJ Shen (2004) A *WRKY* Gene from creosote bush encodes an activator of the abscisic acid signaling pathway. *Journal of Biological Chemistry* 279:55770-55779.

**Funded External Grants:**

1. Salt Tolerance of Plants in Semiarid Agricultural Regions: Interactive Effects of Salinity, Nitrogen Nutrition and High Light on Water Use and Photosynthesis. USGS \$15,000 (1985-1986).
2. Stress Effects on the Functioning and Efficiency of CO<sub>2</sub> Fixation. USDA Competitive Grants Environmental Stress Program \$89,000 (1985-1987).
3. Salt Tolerance of Plants in Semiarid Agricultural Regions: Salinity Effects on Photosynthetic Metabolism. USGS \$21,000 (1986-1987).
4. Mechanisms for the Control of RuBP Carboxylase Activity. NSF Metabolic Biology \$85,000 (1986-1988).
5. Stimulation of Competitive Research in Plant Biology at the Desert Research Institute (with T.D. Sharkey). NSF EPSCoR Program \$496,000 (NSF portion only) (1986-1991).
6. Dynamic Responses of Photosynthesis to Variable Light (R.W. Pearcy, P.I.). USDA Competitive Grants Photosynthesis Program (subcontract) \$6,285 (1987-1988).
7. Environmental Stress Effects on Photosynthetic Carbon Metabolism. USDA Competitive Grants Environmental Stress Program \$205,000 (1987-1990).
8. Light Regulation of Rubisco Activity and Photosynthesis. NSF Metabolic Biology \$47,500 (1988-1989).
9. Metabolism of 2-Carboxyarabinitol 1-Phosphate and Regulation of Rubisco Activity. USDA Competitive Grants Photosynthesis Program \$100,000 (1989-1991).
10. Acquisition of Plant Growth Chambers at the University of Nevada-Reno. NSF Instrumentation Program \$40,000 (1990-1992) (plus \$68,000 in College and Departmental matching funds).
11. CA1P and CA Metabolism in Photosynthesis. USDA National Research Initiative Competitive Grants Photosynthesis Program \$86,000 (1991-1993).

**Funded External Grants: cont'd.**

12. Branched-Chain Monosaccharides in Leaves: Biochemistry and Environmental Responses. USDA National Research Initiative Competitive Grants Photosynthesis Program \$110,000 (1993-1995).
13. Plant Responses to Rising Atmospheric CO<sub>2</sub> and Temperature. NSF EPSCoR Program \$2,220,000 (1993-1998) (plus \$2,220,000 in University matching funds).
14. HPAE-PAD System for the Identification and Measurement of Plant Carbohydrates. USDA National Research Initiative Competitive Grants Equipment Program (CoPI with B.d. Moore) \$40,105 (1993).
15. Responses of Desert Vegetation to Increasing Atmospheric CO<sub>2</sub>. DOE EPSCoR Program \$500,000 (1994-1996)
16. Molecular Mechanisms Controlling Plant Responses to Elevated CO<sub>2</sub>. NSF Integrative Plant Biology Program \$242,985 (1995-1998).
17. Effects of Elevated CO<sub>2</sub> on a Mojave Desert Ecosystem. NSF/DOE/NASA/USDA Interagency Terrestrial Ecology and Global Change Program \$415,000 (1995-1998) (CoPI with Stan Smith [PI], Tim Ball, Bob Nowak, Yiqi Luo)
18. Workshop: Plant Acclimation to Elevated CO<sub>2</sub>. USDA Plant Responses to the Environment Program \$5000 (1995-1996) (CoPI with David Wolfe and many others).
19. From Nuclear Bombs to Nuclear Genes: Use of the NTS Desert FACE Facility to Study the Molecular Biology of Plant Responses to Global Environmental Change. DOE-UNR Cooperative Program \$48,818 (1997)
20. Responses of Desert Vegetation to Elevated Atmospheric Carbon Dioxide. DOE EPSCoR Program \$380,000 (1996-1997) (with S. Smith, R. Nowak, J Coleman, CoPIs)
21. Construction of the Nevada Desert FACE Facility. DOE Nevada Operations Office \$620,000 (1996-1997) (with S. Smith, R. Nowak, J Coleman, CoPIs)
22. Assessment of the Effect of the Variable Biosphere 2 Atmosphere on Plant Responses to Elevated CO<sub>2</sub>. Biosphere 2 Research Incentive Grant \$41,259 (1997-1998) (with K. Griffin, joint PI)
23. Plant Respiration at Elevated CO<sub>2</sub>: Mechanisms of Response. NSF Ecological and Evolutionary Physiology Program \$256,000 (1997-2000) (CoPI with K. Griffin)

**Funded External Grants: cont'd.**

24. The Nevada Desert FACE Facility: Responses of a Desert Ecosystem to Long-Term Elevated Atmospheric Carbon Dioxide. DOE EPSCoR Program \$594,750 (1997-1999) (with S. Smith, R. Nowak, J Coleman, CoPIs)
25. Photosynthetic Acclimation, Carbohydrate Signaling and Molecular Control of Gene Expression at Elevated Atmospheric Carbon Dioxide. NSF Integrative Plant Biology Program \$80,000 (1998-1999)
26. Effects of Elevated CO<sub>2</sub> on a Mojave Desert Ecosystem. NSF/DOE/NASA/USDA Terrestrial Ecology and Global Change Program. \$1,300,000 (1998-2001) (with Stan Smith [PI], James Coleman, David Evans, Weixin Cheng, Robert Nowak, Brandon Moore, [CoPIs])
27. The Nevada Desert FACE Facility: Responses of a Desert Ecosystem to Long-Term Elevated Atmospheric Carbon Dioxide. DOE EPSCoR Program \$297,375 (1999-2000) (with S. Smith, R. Nowak, J Coleman, [CoPIs])
28. EPSCoR: Research Infrastructure for Nevada's Growth - Targeting Research With Uniqueness and Excellence (RING-TRUE). NSF EPSCoR Program. \$1,110,653 - genomics component only, (1999-2002) (Director of genomics component only, with James Coleman [PI], Dennis Lindle, Scott Tyler [CoPIs])
29. A Genomics Approach to Studying Ecosystem Responses to Elevated Atmospheric CO<sub>2</sub>: Building a Foundation for Studies of Biodiversity. Nevada NSF EPSCoR Program. \$50,000 (2000-2002) (with Charles Moehs and Christina Wells, Co-PIs).
30. Purchase of CO<sub>2</sub> for the Nevada Desert FACE Facility During Fiscal Year 2000. DOE Office of Science. \$150,000 (2000-2001) (with James Coleman, Lynn Fenstermaker, Robert Nowak, and Stanley Smith, CoPI's).
31. Biotic Processes Regulating the Carbon Balance of Desert Ecosystems. DOE Office of Science Terrestrial Carbon Processes Program. \$2,250,000 (2000-2003) (with James Coleman, Lynn Fenstermaker, Robert Nowak and Stanley Smith, CoPIs).
32. Environmental Sciences Research and Training Opportunities Program. EPA NHEERL/Atlantic Ecology Division. \$700,000 (2002-2005) (Deborah Grossman-Garber, PI and numerous CoPI's).
33. Environmental Biotechnology in Rhode Island. USDA Special Research Grants. \$2,796,000 (2002-2006) (with Terence Bradley, CoPI).

**Funded External Grants: cont'd.**

34. Project Jump Redux II: Strengthening and Diversifying our Future Workforce in the Food and Agricultural Sciences. USDA-CSREES Higher Education Multicultural Scholars Program. \$100,000 (2002-2006) (with Deborah Grossman-Garber, PI and numerous CoPI's).
35. Drawing a Roadmap to Research Excellence in Rhode Island. NSF EPSCoR Program. \$429,153 (2003-2005).
36. Rhode Island EPSCoR: Catalyzing a Life Sciences Research, Education and Innovation Network. NSF EPSCoR Program. \$6,750,000 (2006-2009) (with Andries van Dam, CoPI).