

CURRICULUM VITAE

PROFESSOR RONALD ROBBERECHT

Department of Forest, Rangeland, and Fire Sciences
and

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University of Idaho, Moscow, Idaho 83844-1133 USA

EDUCATION

Ph.D., Utah State University, 1981
M.S., Utah State University, 1977
B.S., San Diego State University, 1974

CONTACT INFORMATION

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RESEARCH EMPHASIS Physiological plant ecology; plant response to environmental stress factors; mechanisms of plant competition; cold and heat stress effects; plant water relations; photosynthesis and plant energy balance; extensive research on mechanisms of plant response to natural and enhanced levels of UV-B radiation; scientific visualization for integration among ecological scales from molecule to globe. The development and integration of information technology for science education.

TEACHING EMPHASIS & INFORMATION TECHNOLOGY FOR SCIENCE EDUCATION Overall goals are to design and use state-of-the-art information technology to provide students the highest quality and level of learning opportunities, and to empower students to master the subject matter independently under the guidance of interactive computer-based learning materials that use original and adapted content. General areas of ecology and natural resources: Undergraduate courses in introductory general ecology for sophomore and senior level students, a graduate course in physiological plant ecology; an extensive program in guided independent learning, which involves the use of information technology for teaching and learning in the in-class and online learning environment.

Current courses

Ecology (NR 321)
Ecophysiology online (REM 560)
Presentation Skills for Scientists (NR 504)
Restoration Ecology (REM 440)
Scientific Graphics Design online (NR 525)

Past courses

Ecology (REM 221)
Restoration Ecology (REM 552)
World Biomes (REM 452)

Learning portal: EcologyOnline.net

EMPLOYMENT

Professor, Department of Forest, Rangeland, and Fire Sciences, College of Natural Resources, University of Idaho, Moscow, Idaho, December 1983 - present.

Director, Master of Natural Resources (MNR) Graduate Program, College of Natural Resources, University of Idaho, Moscow, Idaho, 2011 - 2016.

Professor in two university-wide interdisciplinary programs: Environmental Science Program (1993 – present) and the Bioinformatics and Computational Biology (2003 – present).

Fulbright Scholar at the Institute of Biology and Geology, University of Tromsø, Norway, 1990-1991.

Assistant Research Professor, Systems Ecology Research Group, California State University, San Diego, May-December 1983.

Postdoctoral Fellow, Laboratory of Biomedical and Environmental Sciences, University of California, Los Angeles, October 1981 - April 1983.

Research Associate, Department of Range Science and the Ecology Center, Utah State University, May - September 1981.

PUBLICATIONS

- Suchar, V.A. and R. Robberecht. 2017. Integration and scaling of UV-B radiation effects on plants: the relative sensitivity of growth forms and interspecies interactions. *Journal of Plant Ecology* 11(4):656-670.
- Suchar, V.A. and R. Robberecht. 2016. Integration and scaling of UV-B radiation effects on plants: from cell to the whole plant. *Ecology and Evolution* 6(14):4866-84.
- Suchar, V.A., and R. Robberecht. 2015. Integration and scaling of UV-B radiation effects on plants: from DNA to leaf. *Ecology and Evolution* 10.1002/ece3.1332:1 - 12.
- Lanspergy, K.E., and R. Robberecht. 2008. The efficacy of aerial photography analyses for determining disturbances in aquatic ecosystems. *Canadian Journal of Remote Sensing* 34:S364-S375.
- Robberecht, R. 2007. Interactive nonlinear learning environments. *Electronic Journal of e-Learning* 5:59-68.
- Robberecht, R. 2006. Designing an interactive nonlinear learning environment: An educator's perspective. Proceedings. International Conference on e-Learning. Pages 391-400 in Remenyi, D. editor. ISBN 1-905305-23-0.
- Eitel, J.U.H., P.E. Gessler, A.M.S. Smith, and R. Robberecht. 2006. Suitability of existing and novel spectral indices to remotely detect water stress in *Populus* spp. *Forest Ecology and Management* 229:170-182.
- Bassman, J.H. and R. Robberecht. 2006. Growth and gas exchange in field-grown and greenhouse-grown *Quercus rubra* following three years of exposure to enhanced UV-B radiation. *Tree Physiology* 26:1153-1163.
- Robberecht, R. Exploring the science of ecology: An interactive multimedia book on CD-ROM.
- Bassman, J.H., G.E. Edwards, and R. Robberecht. 2003. Photosynthesis and growth in seedlings of five forest tree species with contrasting leaf anatomy subjected to supplemental UV-B radiation. *Forest Science* 49:176-187.
- Warren, J.M., J.H. Bassman, D.S. Mattinson, J.K. Fellman, G.E. Edwards, and R. Robberecht. 2002. Alteration of foliar flavonoid composition induced by enhanced UV-B radiation in *Pinus ponderosa*, *Quercus rubra*, *Pseudotsuga menziesii*. *Journal of Photochemistry and Photobiology B: Biology* 66:125-133.
- Bassman, J.H., G.E. Edwards, and R. Robberecht. 2002. Long-term exposure to enhanced UV-B radiation is not detrimental to growth and photosynthesis in Douglas-fir. *New Phytologist* 154:107-120.
- Bassman, J.H., R. Robberecht, and G.E. Edwards. 2001. Effects of Enhanced UV-B Radiation on Growth and Gas Exchange in *Populus deltoides* Bartr. Ex Marsh. *International Journal of Plant Science*. 162:103-110.
- Junttila, O., and R. Robberecht. 1999. Ecological aspects of cold-adapted plants with a special emphasis on environmental control of cold hardening and dehardening. In R. Margesin and F. Schinner, editors. *Cold-adapted organisms - Fundamentals and applications*. Landes Bioscience, Georgetown, Texas, USA. Chapter 2, pages 57 – 77.
- Nagel, L.M., J.H. Bassman, G.E. Edwards, R. Robberecht, and V.R. Franceschi. 1998. Leaf area and anatomical changes associated with exposure to enhanced ultraviolet-B radiation in *Populus trichocarpa*, *Quercus rubra*, *Pseudotsuga menziesii*, and *Pinus ponderosa*. *Physiologia Plantarum*. 104:385-396.
- Sadiq, R., M.W. Stock, D. Wenny, and R. Robberecht. 1998. An expert system for forest nursery management. *AI Applications* 12:41-50.
- Bunting, S.C., R. Robberecht, and G.E. Defossé. 1998. Length and timing of grazing on postburn productivity of two bunchgrasses in an experimental range. *International Journal of Wildland Fire* 8:15-20.

PUBLICATIONS (continued)

- Schumaker, M.A., J.H. Bassman, R. Robberecht, and G. Rademaker. 1997. Growth, leaf anatomy, and physiology of *Populus* clones in response to solar ultraviolet-B radiation. *Tree Physiology* 17:617-626.
- Defossé, G.E., M.B. Bertiller, and R. Robberecht. 1997. Soil water, topography, grazing, and wind effects on emergence and survival of *Festuca* spp. in a grassland of Patagonia. *Journal of Vegetation Science* 8:677-684.
- Defossé, G.E., R. Robberecht, and M.B. Bertiller. 1997. Seedling dynamics of *Festuca* in Patagonia: Competition, microsites, and grazing. *Journal of Range Management* 50:73-79.
- Kolb, P.F. and R. Robberecht. 1996. *Pinus ponderosa* seedling establishment and the influence of competition with the bunchgrass, *Agropyron spicatum*. *International Journal of Plant Sciences* 157:509-515.
- Kolb, P.F. and R. Robberecht. 1996. High temperature and water stress effects on the survival of *Pinus ponderosa* seedlings. *Tree Physiology* 16:665-672
- Defossé, G.E. and R. Robberecht. 1996. Effects of competition on the postfire recovery of 2 bunchgrass species. *Journal of Range Management* 49:137-142.
- Defossé, G.E., M.B. Bertiller, and R. Robberecht. 1995. Germination characteristics of *Festuca pallescens*, a Patagonia bunchgrass with reclamation potential. *Seed Science and Technology* 23:715-723.
- Defossé, G.E. and R. Robberecht. 1995. Ecological and socio-economic strategies for rangeland of the Chubut province, Argentina, for the next century. In J. Powell, editor, Proceedings, International Development Symposium, Society for Range Management, Denver, Colorado, USA.
- Robberecht, R. and G.E. Defossé. 1995. The relative sensitivity of two bunchgrass species to fire. *International Journal of Wildland Fire* 5:127-134.
- Junttila, O. and R. Robberecht. 1993. The influence of season and phenology on freezing tolerance in *Silene acaulis* L., a subarctic and arctic cushion plant of circumpolar distribution. *Annals of Botany* 71:423-426.
- Robberecht, R. and O. Junttila. 1992. The freezing response of an arctic cushion plant, *Saxifraga caespitosa* L.: Acclimation, freezing tolerance and ice nucleation. *Annals of Botany* 70:129-135.
- Alcocer-Ruthling, J.B.M., R. Robberecht, and D. C. Thill. 1989. Response of *Bouteloua scorpiodes* to water stress at two phenological stages. *Botanical Gazette* 150:454-461.
- Robberecht, R. Environmental Photobiology. 1989. Pages 134-154 in K.C. Smith, editor. *The Science of Photobiology*. Plenum, New York, USA.
- Robberecht, R. 1988. Big galleta grass - A warm season bunchgrass in the Sonoran and Mojave Deserts. *Rangelands* 10:58-60.
- Defossé, G.E., J.B.M. Alcocer-Ruthling, and R. Robberecht. 1987. A program for range science development in Patagonia, Argentina. Pages 60-65 in J.T. O'Rourke, editor. *Proceedings, International Rangeland Development Symposium, Society for Range Management*.
- Defossé, G.E. and R. Robberecht. 1987. Patagonia: Range Management at the end of the world. *Rangelands* 9:106-109.
- Bunting, S.C. and R. Robberecht. 1986. Development of flame ring for studying the fire effects on plants. *Restoration & Management Notes* 4:1-2.

PUBLICATIONS (continued)

- Robberecht, R. and M.M. Caldwell. 1986. Leaf UV optical properties of *Rumex patientia* and *Rumex obtusifolius* L. in regard to a protective mechanism against solar UV-B radiation injury. Pages 251-259 in R.C. Worrest and M.M. Caldwell, editors. Stratospheric ozone reduction, solar ultraviolet radiation and plant life. Springer-Verlag, Berlin, Federal Republic of Germany.
- Robberecht, R. and P.S. Nobel. 1986. Intraspecific competition in *Hilaria rigida*, a C4 bunchgrass endemic to southwestern United States desert rangelands. Pages 463-464 in P.J. Joss, P.W. Lynch, and O.B. Williams, editors. Rangelands: A resource under siege. Australian Academy of Sciences, Canberra, Australia.
- Robberecht, R., B.E. Mahall, and P.S. Nobel. 1983. Experimental removal of intraspecific competitors - Effects on water relations and productivity of a desert bunchgrass, *Hilaria rigida*. *Oecologia* 60:21-24.
- Robberecht, R. and P.S. Nobel. 1983. A Fibonacci sequence in rib number for a barrel cactus. *Annals of Botany* 51:153-155.
- Caldwell, M.M., R. Robberecht, and S.D. Flint. 1983. Internal filters: Prospects for UV-acclimation in higher plants. *Physiologia Plantarum* 58:445-450.
- Robberecht, R. and M.M. Caldwell. 1983. Protective mechanisms and acclimation to solar ultraviolet-B radiation in *Oenothera stricta*. *Plant, Cell and Environment* 6:477-485.
- Caldwell, M.M., R. Robberecht, R.S. Nowak, and W.D. Billings. 1982. Differential photosynthetic inhibition by ultraviolet radiation in species from the arctic-alpine life zone. *Arctic and Alpine Research* 14:195-202.
- Robberecht, R., M.M. Caldwell, and W.D. Billings. 1980. Leaf ultraviolet optical properties along a latitudinal gradient in the arctic-alpine life zone. *Ecology* 61:612-619.
- Caldwell, M.M., R. Robberecht, and W.D. Billings. 1980. A steep latitudinal gradient of solar ultraviolet-B radiation in the arctic-alpine life zone. *Ecology* 61:600-611.
- Robberecht, R. and M.M. Caldwell. 1978. Leaf epidermal transmittance of ultraviolet radiation and its implications for plant sensitivity to ultraviolet-radiation induced injury. *Oecologia* 32:277-287.

CONTRIBUTED PAPERS

- Suchar, V.A., and R. Robberecht. 2012. Integration and scaling of UV-B radiation effects on plants: from DNA to whole plant. Abstract. Ecological Society of America, annual national meeting, Portland, Oregon, USA.
- Robberecht, R. 2009. Atmosphere to ground: Integrating and scaling ecological processes through interactive learning designs. Upper Mid-West Atmospheric Consortium. University of North Dakota, Grand Forks, North Dakota, USA. August 2009.
- Hyde, J., A.M.S. Smith, R. Ottmar, P. Morgan, and R. Robberecht. 2009. The affect of decomposition on coarse woody debris. 4th International Fire Congress. Savannah, Georgia, USA.
- Robberecht, R. 2006. Designing an interactive nonlinear learning environment: An educator's perspective. International Conference on e-Learning. Montreal, Canada, June 22-23, 2006. Abstract.
- Eitel, J.U., P. Gessler, A. Smith, and R. Robberecht. 2005. Suitability of existing NIR and novel SWIR spectral indices to remotely detect water stress in *Populus* spp. Abstract. American Geophysical Union, annual national meeting. Earth Observations Systems 86(52). December 5-9, San Francisco. Abstract.
- Robberecht, R. 2005. Guided independent learning in science: Interactive learning materials for ecology. Abstract. Workshop on Educating the Net Generation, University of Idaho.

CONTRIBUTED PAPERS (continued)

- Bassman, J.H., G.E. Edwards, and R. Robberecht. 2000. Effects of enhanced UV-B radiation on six north temperate forest tree species with contrasting leaf anatomy. Abstract. Workshop on Impacts of UV Radiation on Terrestrial and Aquatic Ecosystems. 2nd SPARC General Assembly, Stratospheric Processes and their Role in Climate, World Climate Research Programme, Mar del Plata, Argentina.
- Warren, J.M., J.H. Bassman, D.S. Mattinson, J.K. Fellman, G.E. Edwards, and R. Robberecht. 2000. Alteration of foliar flavonoid composition induced by enhanced UV-B radiation in *Pinus ponderosa*, *Quercus rubra*, *Pseudotsuga menziesii*, and *Populus trichocarpa*. Abstract. North American Forest Biology Workshop in Merida, Mexico. July 16-20, 2000.
- Robberecht, R. and W.S. Hunt. 1996. Seasonal changes in the freezing tolerance of *Pinus ponderosa* seedlings and the bunchgrass, *Agropyron spicatum*. Abstract. Fifth International Cold Hardiness Seminar, Corvallis, Oregon, USA.
- Robberecht, R., W.S. Hunt, and J.D. Marshall. 1995. Instrumentation for analysis of freezing tolerance in conifer and grass seedlings. Abstract. Ecological Society of America, annual national meeting, Salt Lake City, Utah, USA.
- Robberecht R. and W.S. Hunt. 1995. Freezing tolerance and cold acclimation of seedlings of *Pinus ponderosa* and *Agropyron spicatum*, two competing species in a forest/grassland ecotone: Instrumentation and plant response. Abstract, Gordon Conference on Temperature Stress in Plants.
- Defossé, G.E., M.B. Bertiller, and R. Robberecht. 1995. Germination characteristics of *Festuca pallescens*, a Patagonian bunchgrass with reclamation potential. Abstract. Society for Range Management, annual national meeting, Phoenix, Arizona, USA.
- Defossé, G.E., M.B. Bertiller, and R. Robberecht. 1995. Soil water, topography, grazing, and wind effects on *Festuca* spp.: Emergence and survival in a grassland of Patagonia, Argentina. Abstract. Society for Range Management, annual national meeting, Phoenix, Arizona, USA.
- Defossé, G.E. and R. Robberecht. 1995. Ecological and socio-economic strategies for rangeland of the Chubut province, Argentina, for the next century. Abstract. International Development Symposium, Society for Range Management, Phoenix, Arizona, USA.
- Robberecht, R. and O. Junttila. 1992. Freezing tolerance, cold acclimation, and energy balance for two northern latitude cushion plant species. Abstract. Ecological Society of America, annual national meeting, Honolulu, Hawaii, USA.
- Kolb, P.F. and R. Robberecht. 1992. The effects of water stress on thermal tolerance for *Pinus ponderosa* seedlings. Abstract. Ecological Society of America, annual national meeting, Honolulu, Hawaii, USA.
- Robberecht, R. and O. Junttila. 1991. The freezing response of a subarctic and arctic cushion plant, *Saxifraga caespitosa* L. Abstract. XVI Congress of Scandinavian Society for Plant Physiology, Ulvik, Norway.
- Robberecht, R. and O. Junttila. Freezing tolerance and cold acclimation in arctic populations of *Saxifraga caespitosa* L. 1991. Abstract. IV International Cold Stress Seminar, Uppsala, Sweden.
- Kolb, P.F., and R. Robberecht. 1991. Bunchgrass competition and environmental stress effects on *Pinus ponderosa* seedlings. Abstract. Ecological Society of America, annual national meeting, San Antonio, Texas, USA.
- Robberecht, R. 1990. Photosynthesis and canopy structure of an adventive weedy species, *Centaurea solstitialis* L. Abstract. Ecological Society of America, annual national meeting, Salt Lake City, Utah, USA.

CONTRIBUTED PAPERS (continued)

- Robberecht, R. 1990. Mechanisms of protection against natural and enhanced solar UV-B radiation: The role of pigments and leaf optical properties. Symposium paper. Fourth International Congress of Systematic and Evolutionary Biology, Smithsonian Institution and the University of Maryland, Washington, D.C., USA.
- Dobson, J.L., R. Robberecht, and J.D. McKendrick. 1989. The response of *Arctophila fulva* to rapidly changing aquatic and terrestrial habitats associated with oil development in northern Alaska. Abstract. Ecological Society of America, annual national meeting, Toronto, Canada.
- Robberecht, R. 1989. The effects of solar ultraviolet radiation, UV-B, on plant pigments. National workshop on Interactions of UV-B and Plants, Gainesville, Florida, USA.
- Dobson, J.L., R. Robberecht, and J.D. McKendrick. 1989. Phenotypic plasticity of aquatic and terrestrial growth forms of arctic pendant grass. Abstract. Society for Range Management, annual national meeting, Billings, Montana, USA.
- Alcocer-Ruthling, J.B.M. and R. Robberecht. 1988. The response of *Bouteloua scorpioides* to water stress at two phenological stages. Abstract, Ecological Society of America, annual national meeting, Davis, California, USA.
- Robberecht, R. 1987. The significance of highly glaucous leaves in grasses: The influence on leaf and canopy optical properties, photosynthesis and energy balance. Abstract, XIV International Botanical Congress, Berlin, Germany.
- Defossé, G.E., J.B.M. Alcocer-Ruthling, and R. Robberecht. 1987. A program for range science in Patagonia, Argentina. Proceedings, International Development Symposium, Society for Range Management, Boise, Idaho, USA.
- Robberecht, S.C. Bunting, and G.E. Defossé. 1987. Response of bunchgrasses to fire: Instrumentation and plant sensitivity. Abstract, Society for Range Management, annual national meeting, Boise, Idaho, USA.
- Robberecht, R. and S.C. Bunting. 1986. Simulation of grassland wildfire: Instrumentation and plant response. Abstract, Ecological Society of America, annual national meeting, Syracuse, New York, USA.
- Chausi, E.B., R. Robberecht. 1985. Seasonal grazing -- a practical management system for the Ngorongoro Conservation Area, Tanzania. Abstract, Society for Range Management, annual national meeting, Salt Lake City, Utah, USA.
- Robberecht, R. 1984. Roots: Reflections on belowground management. Society for Range Management, Idaho Section, Boise, Idaho, USA.
- Robberecht, R. and P.S. Nobel. 1984. Intraspecific competition in *Hilaria rigida*, a C4 bunchgrass endemic to southwestern United State rangelands. Second International Rangeland Congress, Adelaide, Australia.
- Robberecht, R. 1983. Adaptive mechanisms in higher plants to solar ultraviolet-B radiation. Invited paper at the NATO-sponsored Advanced Research Workshop on The impact of solar ultraviolet (UV-B) radiation upon terrestrial ecosystems. Bad Windsheim, West Germany.
- Robberecht, R. and P.S. Nobel. 1983. Response of a perennial grass to altered plant density. Abstract, Ecological Society of America, annual national meeting, Grand Forks, North Dakota, USA.
- Robberecht, R., B.E. Mahall, and P.S. Nobel. 1983. Intraspecific competition in the desert bunchgrass, big galleta (*Hilaria rigida*). Abstract, Society for Range Management annual national meeting, Albuquerque, New Mexico, USA.

CONTRIBUTED PAPERS (continued)

- Robberecht, R. and M.M. Caldwell. 1982. Analysis of leaf optical properties. Abstract, Association Internationale de Photobiologie, International workshop of the Effects of ultraviolet radiation on plants, New Delhi, India.
- Caldwell, M.M., R. Robberecht, and S.D. Flint. 1982. Internal filters: Prospects for UV-acclimation in higher plants. Abstract, Association Internationale de Photobiologie, International workshop of the Effects of ultraviolet radiation on plants, New Delhi, India.
- Robberecht, R. and P.S. Nobel. 1982. A Fibonacci number sequence of rib development in a barrel cactus, *Ferocactus acanthodes*. Abstract, Ecological Society of America, annual national meeting, State College, Pennsylvania, USA.
- Robberecht, R. and M.M. Caldwell. 1980. Mechanisms of higher plant acclimation to solar UV radiation. Abstract, Ecological Society of America, annual national meeting, Tucson, Arizona, USA.
- Robberecht, R. and M.M. Caldwell. 1978. Leaf epidermal transmittance of ultraviolet radiation and its implication for plant sensitivity to ultraviolet-radiation injury. Abstract, Ecological Society of America, annual national meeting, Athens, Georgia, USA.
- Caldwell, M.M., R. Robberecht, and W.D. Billings. 1978. A natural global solar ultraviolet radiation gradient: Irradiance and plant adaptation. Abstract, Ecological Society of America, annual national meeting, Athens, Georgia, USA.

RESEARCH GRANTS AND CONTRACTS

- Forestry remote sensing extension to tribal colleges and land managers. 2009. NASA. With A.M.S. Smith and E. Strand. \$75,586.
- Active learning environments for mastery-oriented learning: Integrating the virtual tutor in science education. 2008-2009. Idaho State Board of Education (SBOE). With A. Smith and E. Strand. \$53,600.
- Application of Lecture Capture Technology (LCT) to Expand Degree Programs, Enhance Teaching and Learning and Transform Curricula. 2007-2008. Idaho State Board of Education (SBOE). With E.E. Krumpe, T. Link, J. Boll, P. Morgan, M. Dakins, C. Hoffman, and D. Schlater. \$80,000.
- New dimensions in online education: Integrating synthetic speech for increased understanding and mastery. 2006-2007. Idaho State Board of Education (SBOE). With E.E. Krumpe. \$66,306.
- Enhancing teaching & learning in large-enrollment classes with student response systems. 2006-2007. Idaho State Board of Education (SBOE). With Fins, Marshal, Krumpe, Gabel, Davico, Armpriest, and Schlater. \$72,047.
- Designing an interactive nonlinear learning environment: An educator's perspective. 2005. University of Idaho Travel Grant. \$900.
- Rangeland habitat types: An interactive electronic book on CD-ROM. 2004-2005. Idaho Rangeland Resource Commission. \$2500. (with S. Garrity.)
- The consequences of stratospheric ozone depletion: An integration of cell-to-ecosystem responses to enhanced solar UV-B radiation. NRI/USDA Competitive Grants Program. \$5,000. (with J.H. Bassman, Washington State University.)

RESEARCH GRANTS AND CONTRACTS (continued)

- North temperate ecosystem level responses to enhanced UV-B radiation. 2003 -2004. USDA grant (with J.H. Bassman and L.A. Shipley, Washington State University.) (\$72,000).
- Interactive virtual reality models for science education: Conceptual models in ecology. 2002 -2003. University of Idaho Teaching/Learning Grant. (\$3,500).
- A new learning environment: Expanding environmental science degree course offerings in Idaho. Idaho State Board of Education. Grant with M. von Braun (principal investigator) and 12 co-principal investigators. 1999-2002. \$311,407.
- Effect of enhanced UV-B radiation on carbon dynamics in selected tree species. 1997. USDA Competitive Grants Program (with J. H. Bassman and G.E. Edwards, Washington State University, Pullman, Washington). 1997-1999 (\$141,000). Continued funding awarded after a grant proposal competition until 2000.
- Regeneration potential of vegetation on newly exposed riverside shorelines. 1997. United States Army Corps of Engineers (\$49,860).
- An interactive multimedia course and electronic book on plant biology: A proposal for computer-aided education. 1997. Norwegian Marshall Fund (\$4,500).
- Grant for enhanced teaching and learning. 1997. University of Tromsø, with O. Junntila and A. Ernsten (\$8,330).
- Interactive multimedia modules on world ecosystems. 1996. University of Idaho Teaching/Learning Grants program (\$2,500).
- Goal oriented management and planning for forest nurseries: Interactive computer applications for effective use of forest resources. McIntire-Stennis Grant Program with Molly Stock and David Wenny. 1995-1997 (\$53,459).
- Effect of enhanced UV-B radiation on carbon dynamics in selected tree species. USDA Competitive Grants Program (with J. H. Bassman and G.E. Edwards, Washington State University, Pullman, Washington). 1994-1997 (\$161,000).
- Development of multimedia modules for instruction. 1994. University of Idaho Teaching Mini-Grants (\$2,350).
- Development of a multimedia course on CD-ROM. 1995. University of Idaho Teaching/Learning Grants program (\$1,456).
- Freezing tolerance, cold acclimation, and photosynthetic capacity of coniferous seedlings and bunchgrasses: Consequences for forest regeneration and responses to global climate change. McIntire-Stennis Grants Program (with John Marshall, Forest Resources). 1992-1994, \$89,900.
- Norwegian Marshall Fund grant for study in Norway. 1992. (\$4,000).
- Fulbright Scholar Award, 1990, for research in at the University of Tromsø, Norway on the influence of solar radiation and environmental variation on subarctic and arctic plant species (\$10,000).
- Norwegian Research Council. 1990. (With J. Nilsen and the Institute of Biology and Geology, University of Tromsø, Norway, \$21,700.)
- Teaching Improvement Award (jointly with M. Stock), College of Forestry, Wildlife and Range Sciences. 1989. (\$800).
- University of Idaho Small Travel Grants (1987, 1990, and 1992, \$600 each).

RESEARCH GRANTS AND CONTRACTS (continued)

Physiological ecology of arctic tundra plants. 1989. The Norwegian Marshall Fund (\$5,000).

The effect of interspecific plant competition on the productivity of tree seedlings during the regeneration of forest stands. 1988. McIntire-Stennis Research Grants Program (\$68,941, three years).

Ecophysiology and mechanisms of plant interference for an adventive species in disturbed rangelands. 1987. USDA Cooperative State Research Service, Rangeland Research Grants Program (\$51,186, three years).

Arctophila feasibility study. 1986. Subcontract through Standard Alaska Production Company (SOHIO) and the University of Alaska, Fairbanks (\$75,088, three years).

The adaptive significance of highly glaucous leaves in regard to leaf energy balance and ecology of grasses. University of Idaho Internal Research Funds, Seed Grant, 1985 (\$3500).

Effects of length and timing of grazing on postburn productivity. USDA Forest Service, Fire Lab. (with S.C. Bunting), 1984 (\$12,000, three years).

Water relations and productivity for two bunchgrass species during plant regeneration after fire. University of Idaho Internal Research Funds, Seed Grant, 1984 (\$3,265).