

# CURRICULUM VITÆ

DAVID R. SMART

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Education: Ph.D, Botany (Physiological Ecology), University of California, Davis, 1991.  
MSc., Botany, University of California, Davis, 1985.  
B.S., Entomology, University of California, Davis, 1978, honors.

Research Interests: The biogeochemistry of carbon, nitrogen and water cycling in agricultural ecosystems. The physiological ecology of grapevine and tree root systems. Water relations of woody perennial plants, and water vapor and trace gas exchange in the plant-soil-atmosphere continuum. Climate change, the role of agricultural soil carbon and nitrogen trace gas exchanges in carbon sequestration by perennial crops.

## Professional Experience:

- 2006 – pres: Associate Professor, Dept of Viticulture & Enology, Associate Plant Physiologist, Agricultural Experiment Station, University of California, Davis.
- 2000-2005: Assistant Professor, Dept of Viticulture & Enology, Assistant Plant Physiologist, Agricultural Experiment Station, University of California, Davis.
- 1997-2000: Visiting Scientist. Dept of Vegetable Crops, University of California, Davis.
- 1994-1997: Visiting Scientist. Centre de Recerca Ecològica i Aplicacions Forestal (CREAF), Universitat Autònoma de Barcelona, Bellaterra (Barcelona) Spain.
- 1991-1994: Postdoctoral Fellow. Department of Plants, Soils, and Biometeorology, Utah State University, Logan Utah.
- 1985-1990: Research Assistant. Department of Vegetable Crops, University of California, Davis California.
- 1982-1984: Staff Research Associate. Department of Botany, University of California, Davis California.

## Languages:

English, fluent  
Spanish, fluent  
Catalan, fluent

## Professional Affiliations (current and previous):

American Association for the Advancement of Science  
American Society for Microbiology  
American Society of Plant Physiologists  
Ecological Society of America  
American Society of Enology and Viticulture

## Publications:

- Muhammad, S, BL Sanden, BD Lampinen, SS Silva, MI Siddiqui, **DR Smart**, A Olivos, KA Shackel, T DeJong, PH Brown (2015) Seasonal Changes in nutrient content in a mature deciduous tree species: Studies of Almond (*Prunus dulcis* (Mill.) D. A. Webb). *European Journal of Agronomy* (in press) (cif 3.67).
- Huang, H, J Wang, D Hui, DR Miller, S Bhattarai, S Dennis, **DR Smart**, T Sammis and KC Reddy (2014) Nitrous oxide emissions from a commercial cornfield (*Zea mays*) measured using the eddy-covariance technique. *Atmospheric Chemistry and Physics* 14:12839-12854 (cif 5.51)
- Eissenstat, DM, TL Bauerle, KA Marchetto, LH Comas, L Radville, AN Lakso, **DR Smart** and R Dunst (2014) Seasonal patterns of root production in grape. *Functional Plant Biology* (in review) (citation impact factor, cif 2.47)
- Deng, Q, D Hui, J Wang, T Jima, S Iwuzo, C-Li Yu, **DR Smart**, C Reddy and S Dennis (2014) Effects of no-tillage and improved fertilizer management on corn yield and soil N<sub>2</sub>O emission in middle Tennessee. *Agricultural Ecosystems and Environment* (in review) (cif 2.86).
- Sáenz de Santa María, FC, GM Organero, CD Gustems, **DR Smart**, CC Prado, JO Marfà i Pagès, F de Herralde, E Crivillés, MT de Andrés, LGaforio, SG Muñoz, C Rubio, R Savé, C Biel, X Aranda, M Salamero, MM Alsina (2014) Jornada Tècnica. Producció viverística de ceps: optimització tecnològica i metodològica,
- Smart, DR**, CM Stockert KM Scow (2014) Spatial constraints on N<sub>2</sub>O emissions and microbial activity during drip irrigation of perennial crops. *Soil Biology and Biochemistry*, in revision (cif 3.67).
- Alsina, M del Mar, AF Borges and **DR Smart** (2013) Spatiotemporal variation of event related N<sub>2</sub>O and CH<sub>4</sub> emissions during fertigation in a California almond orchard (*Prunus dulcis* Batsch). *Ecosphere* 4:1-21 (cif 4.41)
- Stockert, CM, LF Bisson, DO Adams and **DR Smart** (2013) Nitrogen status and fermentation dynamics of Merlot on two rootstocks. *American Journal of Enology & Viticulture* 64:195-201 (cif 0.87)
- Alsina, M del Mar, T Cheng, D Riaño, M Whiting, S Ustin and **DR Smart** (2013) Water status detection in California table grapes: from leaf to airborne. pp. 225-231 In Stafford, J.V. (Ed) Precision Agriculture '13, Proceedings of the 9th International Conference on Precision Agriculture July 7-11 Lleida, Spain, Wageningen Academic Publishers, the Netherlands.
- Smart, DR**, S Hess, SE Ebeler, HH Heymann and RE Plant (2013) Grape physiology, composition and sensory characteristics in a selective harvest winegrape vineyard pp. 649-657 In Stafford, J.V. (Ed) Precision Agriculture '13, Proceedings of the 9th International Conference on Precision Agriculture July 7-11 Lleida, Spain, Wageningen Academic Publishers, the Netherlands.
- Zufferey, V and **DR Smart** (2012) Stomatal behavior of irrigated *Vitis vinifera* cv Syrah following partial root removal. *Functional Plant Biology*, 39:1019 - 1027 (cif 2.93)

- Schellenberg, D, M del Mar Alsina, S Muhammad, CM Stockert, BL Sanden, PH Brown and **DR Smart** (2012) Yield-scaled global warming potential from N<sub>2</sub>O emissions and CH<sub>4</sub> oxidation for almond (*Prunus dulcis*) irrigated with nitrogen fertilizers on arid land (*Prunus dulcis*). *Agricultural Ecosystems and Environment* 155:7–15. (cif 3.67)
- Shapland, TH, RL Snyder, **DR Smart** and LE Williams (2012) Estimation of sensible heat flux density and latent heat flux density in vineyards located on hillside terrain using calibrated surface renewal analysis. *Irrigation Science* 30:471–484. (cif 2.12)
- Smart, DR**, M del Mar Alsina, T Bauerle and V Zufferey (2012) Can rootstocks really confer drought tolerance upon grapevine scions? A case study of *Vitis vinifera* cv Merlot on two rootstocks. In Hirst, P (Ed.) Proceedings of the Below Ground Health and Quality Conference, Mildura Australia.
- Smart, DR**, M del Mar Alsina, MW Wolff, MG Matiasek, DS Schellenberg, JP Edstrom, PH Brown and KM Scow (2011) N<sub>2</sub>O emissions and water management in California perennial crops. pp. 227-255 In Guo, L, AS Gunasekara and LL McConnell (Eds.) Understanding Greenhouse Gas Emissions from Agricultural Management, American Chemical Society, Baltimore MD USA.
- Suddick, EM, GM Garland, KL Steenwerth, **DR Smart** and JW Six (2011) Discerning agricultural management effects on nitrous oxide emissions from conventional and alternative cropping systems: A California case study. pp. 223-226 In Guo, L, AS Gunasekara and LL McConnell (Eds.) Understanding Greenhouse Gas Emissions from Agricultural Management, American Chemical Society, Baltimore MD USA.
- Rodriguez, J-R, RE Plant, J-J Lambert and **DR Smart** (2011) Using apparent soil electrical conductivity (EC<sub>a</sub>) to characterize vineyard soils of high clay content. *Precision Agriculture* 12:775-794. (cif 1.728)
- Alsina, M. del Mar, **DR Smart**, T Bauerle, F de Herralde, C Biel, CM Stockert, C Negron and R Save (2010) Seasonal changes of whole root system conductance by a drought tolerant grape root system. *Journal of Experimental Botany* 62:99–109. (cif 4.818)
- Suddick E, KM Scow, WR Horwath, LE Jackson, **DR Smart**, JP Mitchell and J Six (2010) The potential for California agricultural crop soils to reduce greenhouse gas emissions: A holistic approach. *Advances in Agronomy* 107:123-163. (cif 2.06)
- Steenwerth KL, DL Pierce, RG Spencer, EA Carlisle and **DR Smart**. (2009) Disturbance and precipitation effects on soil respiration under Mediterranean conditions. *Soil Science Society of America Journal* 74:231-239. (cif 1.23)
- Volder A, LJ Anderson, **DR Smart**, AJ Bloom, AN Lakso and DM Eissenstat (2009) Estimating nitrogen uptake of individual roots in container and field-grown plants using a <sup>15</sup>N-depletion approach. *Functional Plant Biology* 36:1-8. (cif 2.16)
- Jimenez-Aguilar, A, E Huber-Sannwald, **DR Smart**, T Arredondo Moreno (2009) Biological soil crusts exhibit a dynamic response to seasonal rain and release from grazing with implications for soil stability. *Journal of Arid Environments* 73: 1158-1169. (cif 1.54)
- Bauerle, T., **D.R. Smart**, W. Bauerle, C.M. Stockert and D.M. Eissenstat (2008) Root foraging in response to heterogeneous soil moisture in two grapevines that differ in potential growth rate. *New Phytologist* 179:857-866. (cif 6.52)

- Steenwerth KL, RE Drenovsky, J-J Lambert, DA Kluepfel, KM Scow and **DR Smart** (2008) Soil morphology, depth and grapevine root frequency influence microbial communities in a Pinot Noir vineyard. *Soil Biology and Biochemistry* 40:1330-1340. (cif 1.27)
- Smart DR**, A Breazeale, J Viers, HH Heymann and RE Plant (2008) Anthropogenic intervention in shaping terroir in a California Pinot Noir vineyard. Proceedings of the 5<sup>th</sup> International Terrior Conference 57:201-209. (cif 0.87)
- Savé, R, F de Herralde, M<sup>a</sup> Mar Alsina, X Aranda, C Biel, M Nadal and **DR Smart** (2008) Potenciales vulnerabilidades de la vna en el Priorato frente al cambio global. Revista Enologia No. 95. [http://www.acenologia.com/ciencia95\\_2.htm](http://www.acenologia.com/ciencia95_2.htm)
- Bauerle, TL, JH Richards, **DR Smart** and DM Eissenstat (2008) Importance of internal hydraulic redistribution for prolonging the lifespan of roots in dry soil. *Plant Cell & Environment* 31:177-186. (cif 5.15)
- Bauerle T, DM Eissenstat, J Granett and **DR Smart** (2007) Consequences of grape phylloxera infestations on root survivorship and root age structure in a California vineyard. *Plant, Cell and Environment* 30:786-795. (cif 5.15)
- Rodríguez-Pérez JR, D Riaño, E Carlisle, SL Ustin and **DR Smart** (2007) Evaluation of hyperspectral reflectance indexes to detect grapevine water status in vineyards. *American Journal of Enology and Viticulture* (cif 0.87)
- Eissenstat DM, AN Lakso, D Neilsen, **DR Smart**, TL Bauerle, LH Comas and GH Neilsen. (2006) Patterns of root growth and activity of grape and apple in relation to shoot phenology. *Acta Horticulturae*. 721, 21-26. (cif na)
- Smart, DR**, A Breazeale and V Zufferey (2006) Physiological changes in plant hydraulics induced by partial root removal of irrigated grapevine (*Vitis vinifera* cv. Syrah). *American Journal of Enology and Viticulture* 57:201-209. (cif 0.87)
- Eissenstat, DM, AN Lakso, **DR Smart**, TL Bauerle, LH Comas (2006) Grapevine Root Dynamics. pp. 60-65, In: Proc. Workshop Carbohydrate Dynamics in Grapes, RR Walker, ed., CSIRO Merbein, Vic., Australia.
- Eissenstat DM, D Neilsen, AN Lakso, **DR Smart**, TL Bauerle, LH Comas and GH Neilsen (2005) Patterns of Root Growth and Activity of Grape and Apple in Relation to Shoot Phenology. *Acta Horticulturae* (in press).
- Gentile R., Burger M., Pierce D., Smart D.R. 2006. Impacts of Climate Change on Crop and Animal Physiology in California Agriculture. In Cavagnaro T.R., Jackson L.E., Scow K.M. (eds.) Climate Change: Challenges and Solutions for California Agricultural Landscapes. The California Climate Change Center. <http://www.energy.ca.gov/2005publications/CEC-500-2005-189/CEC-500-2005-189-SF.PDF>
- Carlisle E, KL Steenwerth and **DR Smart** (2006) Conversion of oak woodlands to vineyards alters physical constraints on soil CO<sub>2</sub> respiration in Mediterranean climate ecosystems. *Journal of Environmental Quality* 35:1396-1404. (cif 2.29)
- Smart DR**, E Schwass, L Morano, and AN Lakso (2006) Grapevine root distributions: A comprehensive analysis and review. *American Journal of Enology and Viticulture* 57:89-104. (cif 0.87)
- Smart DR**, TL Bauerle, M Goebel, E Carlisle and C Stockert (2005) Artifacts of grapevine root proliferation following installation of minirhizotron observation tubes. *Acta Horticulturae* 689:153-158. (cif na)

- Wolpert JA, **DR Smart** and MA Anderson (2005) Lower petiole potassium concentration at bloom in rootstocks with *Vitis berlandieri* genetic backgrounds. *American Journal of Enology and Viticulture* 56:163-169. (cif 0.87)
- Smart DR**, E Schwass, L Morano, and AN Lakso (2005) Grapevine root distributions: A comprehensive analysis and review. In: *Soil Environment and Vine Mineral Nutrition Proceedings*, Christensen LP and DR Smart (Eds.), American Society for Enology and Viticulture, June 29-30, San Diego, CA.
- Smart DR** and P Christensen (2005) Soil environment and vine mineral nutrition. *Soil Environment and Vine Mineral Nutrition Proceedings*, Christensen LP and DR Smart (Eds.), American Society for Enology and Viticulture, June 29-30, San Diego, CA.
- Smart DR** and J Peñuelas (2005) Changes in soil CO<sub>2</sub> respiration following precipitation onto dry soils: An investigation of elevated CO<sub>2</sub> using Mediterranean plants. *Applied Soil Ecology* 28:247-257. (cif 2.40)
- Smart DR**, E Carlisle and B Alonso Nuñez (2005) Transverse hydraulic redistribution by a grapevine. *Plant, Cell & Environment* 28:157-167. (cif 5.15)
- Volder A, **DR Smart**, AJ Bloom and DM Eissenstat (2005) Rapid decline in nitrate uptake and respiration with age in fine lateral roots of grape: Implications for root efficiency and competitive effectiveness. *New Phytologist* 165:493-502. (cif 6.52)
- Smart DR** (2004). Exposure to elevated carbon dioxide concentration in the dark lowers the respiration quotient of *Vitis* cane wood. *Tree Physiology* 24:115-120. (cif 2.40)
- Smart DR**, L Kocsis, MA Walker and CM Stockert (2003) Dormant buds and adventitious root formation by *Vitis* and other woody plants. *Journal of Plant Growth Regulation* 21:296-314. (cif 2.07)
- Bloom AJ, **DR Smart**, P Searles and D Nguyen (2002) Elevated carbon dioxide concentrations inhibit nitrate assimilation in wheat shoots. *Proceedings of the National Academy of Sciences of the United States of America*, 99:1730-1735. (cif 9.77)
- Stark JM, **DR Smart**, K Haubensak and SC Hart (2002) Regulation of nitric oxide emissions from forest and rangeland soils of Western North America. *Ecology* 83:2278-2292. (cif 4.78)
- Smart DR** and AJ Bloom (2001) Leaves emit nitrous oxide during nitrate assimilation. *Proceedings of the National Academy of Sciences of the United States of America*, 98:7875-7878. (cif 9.77)
- Smart DR**, JM Stark and V Diego (1999) Resource limitations to nitric oxide emissions from a sagebrush-steppe ecosystem. *Biogeochemistry*, 47:63-86. (cif 2.67)
- Smart DR**, K Ritchie, AJ Bloom, and B Bugbee (1998). Nitrogen and water balances for wheat grown under elevated CO<sub>2</sub>. *Plant, Cell & Environment*, 21:753-763. (cif 5.15)
- Smart DR** and A. J. Bloom (1998) The influence of NH<sub>4</sub><sup>+</sup> on NO<sub>3</sub><sup>-</sup> absorption. I. Correlation between H<sup>+</sup> exchange and NO<sub>3</sub><sup>-</sup> absorption. *Journal of Experimental Botany*, 49, No. 318:95-100. (cif 4.82)
- Smart DR**, K Ritchie, J Stark, and B Bugbee (1997). Evidence that elevated CO<sub>2</sub> increases rhizosphere denitrifier activity. *Applied and Environmental Microbiology*, 63:4621-4624. (cif 3.78)
- Smart DR**, K Ritchie, and B Bugbee (1996) Mass transfer in the biological fast lane: High CO<sub>2</sub> and a shallow root-zone. *Life Support & Biosphere Science* 3:43-46. (cif na)

- Smart DR**, A Ferro, K Ritchie, and B Bugbee (1995) On the use of antibiotics in root physiology and ecology investigations. *Physiologia Plantarum* 95:533-540. (cif 3.07)
- Smart DR**, NJ Chatterton and B Bugbee (1994) The influence of elevated CO<sub>2</sub> on nonstructural carbohydrate distribution and fructan accumulation in wheat canopies. *Plant, Cell & Environment*, 17:435-443. (cif 5.15)
- Smart DR** and AJ Bloom (1993) Relationships between the kinetics of NH<sub>4</sub><sup>+</sup> and NO<sub>3</sub><sup>-</sup> absorption and growth in the cultivated tomato (*Lycopersicon esculentum* cv T-5). *Plant, Cell & Environment*, **16**:259-267. (cif 5.15)
- Bloom AJ, LE Jackson and **DR Smart** (1993) Root growth as a function of ammonium and nitrate in the root zone. *Plant, Cell & Environment*, 16:199-206. (cif 5.15)
- Smart DR** and AJ Bloom (1991) Influence of internal NH<sub>4</sub><sup>+</sup> and NO<sub>3</sub><sup>-</sup> contents on the temperature response of NH<sub>4</sub><sup>+</sup> and NO<sub>3</sub><sup>-</sup> uptake in chilling sensitive and chilling resistant *Lycopersicon* taxa. *Journal of Experimental Botany* 41:331-338. (cif 4.82)
- Smart DR** (1991) Physiology and Ecology of Ammonium and Nitrate Acquisition Among Wild and Domesticated *Lycopersicon* Taxa. Ph.D. Dissertation University of California, Davis.
- Smart DR** and AJ Bloom (1988) Kinetics of ammonium and nitrate uptake among wild and cultivated tomatoes. *Oecologia* **76**:336-340. (cif 3.52)
- Smart DR**, Lasiter J, and RF Norris (1985) Sampling efficiency of the UC-VAC for larva populations of *Hypera brunneipennis* (Coleoptera: Curculionidae) in weed-free and weedy alfalfa communities. *Journal of Economic Entomology* **78**:1264-1266. (cif 1.49)

Publications (in preparation):

- Alsina, M del Mar, MW Wolff and **DR Smart** (2014) Conservation tillage and grape root carbón deposition and distribution (*Journal of Environmental Quality*)
- Smart, DR**, S Hess, SE Ebeler, HH Heymann and RE Plant (2014) A metabolics and sensory analytical approach to examing the role of spatial heterogeneity in wine grape quality (*Geoderma*)
- Carlisle, E, KM Steenwerth and **DR Smart** (2014) Depletion of carbón following conversi3n of forests to vineyards: Changes in carb3n pool sizes based aggregate size distribution. (*Ecological Applications*)
- Zufferey, V and **DR Smart** (2014) Alteration of leaf and berry growth rates of grape following functional reduction of root system size. (*American Journal of Enology & Viticulture*)
- Smart, DR, DL Schellenberg, MW Wolff, S Muhammed, SS Silva, B Lampinen, B Sanden, A Kendall, PH Brown (2014) Nitrogen use efficiency of tree crops in arid environments (Nature Geosciences)

Competitive Grants: (approximately \$7,185,000 during the period in question)

- 2013-2015: Optimizing the Use of Groundwater Nitrogen for Nut Crops. **DR Smart** (PI, UC Davis) (Co-PIs Prof Patrick Brown, Prof Jan Hopmans and Specialist Thomas Harter) California Division of Food & Agriculture, California Pistachio Research Board, Almond Board of California (\$780,970)
- 2012-2015: Using Targeted High Frequency Nitrogen (N) Applications to Diminish Reactive N Mobilization in Micro-irrigated Perennial Crops and Modeling Applications. **DR Smart** (PI, UC Davis) California Division of Food & Agriculture, California Specialty Crops Block Grant Program (\$227,102)
- 2011-2014: Vegetation Response to Experimental and Flooded Riparian Forest Habitat for the Cosumnes Preserve. JH Viers (PI), **DR Smart**, (Co-PI, UC Davis), G Fogg (CoPI, UC Davis) California Department of Fish and Game, The Nature Conservancy (\$1,689,985)
- 2011-2014: Field Testing a Carbon Offset and Greenhouse Gas Emissions Model for California Wine Grape Growers to Drive Climate Protection and Innovation. A Jordan (PI, Wine Institute of California) Co-PIs **DR Smart**, W Salas (Applied Geosolutions), B Morris (Environmental Defense Fund), C King (California Association of Winegrape Growers), K Steenwerth (USDA ARS) and J-M Peltier (National Grape & Wine Initiative) California Specialty Crops Block Grant Program (\$459,985)
- 2010-2012: Carbon Dynamics of Orchard Floor Applied Chipped Almond Prunings as Influenced by Irrigation Methods, Soil Type, Cover Crop Management and Farm Practices. G Ludwig (PI, California Almond Board) J Kimmelshue (NewFields Agricultural & Environmental Resources), W Salas (Applied Geosolutions) and **DR Smart**. (\$304,000)
- 2009-2012: Conservation Tillage of Cover Crops as a Means of Increasing Carbon Sequestration in California Vineyards. **DR Smart** (PI) American Vineyard Foundation, California Competitive Grants Program for Research in Viticulture & Enology, USDA Viticulture Consortium West (\$318,000).
- 2008-2012: Advanced Sensing and Management Technologies to Optimize Resource Utilization in Specialty Crops: Water and Nitrogen Management in Deciduous Crops Under Normal and Resource-limited Conditions. Patrick Brown (PI), KM Schakel, **DR Smart**, B Lampinen, T Sammis, S Ustin, M Whiting, M Shukla. USDA Specialty Crops Research Initiative (\$3,150,000).
- 2008-2011: Remote Sensing of Stomatal Conductance and Soil Water Availability for Vineyard Irrigation Management. DR Smart (PI) American Vineyard Foundation, California Competitive Grants Program for Research in Viticulture & Enology, USDA Viticulture Consortium West (\$60,000).
- 2009-2011: The role of microbial community function in spatial and temporal variation of nitrous oxide gas emissions from California perennial **cropping** systems. **DR Smart** (PI), KM Scow and K Kristova. Kearney Foundation of Soil Science (\$90,000).
- 2007-2009: The role of microbial community function in spatial and temporal variation of nitrogen trace gas emissions from California perennial cropping systems. **DR**

- Smart** (PI), KM Scow and PJ Hernes. Kearney Foundation of Soil Science (\$165,800).
- 2005-2006 The Role of Wide Crosses in Determining Adventitious Root Formation in *Vitis* Rootstock Canewood: A Genomics Approach. **DR Smart** (PI) and MA Walker, Fruit Tree, Nut Tree & Grapevine Improvement Advisory Board (\$40,000).
- 2004-2007: The Importance of Root Decomposition to the Carbon Budgets of Perennial Oak Woodlands and Vineyards in California Mediterranean Climate Ecosystems. **DR Smart** (PI). Kearney Foundation of Soil Science (\$111,800).
- 2004-2005: Restoration of Desertified Landscapes in the Altiplano of Mexico. E Sanwold-Huber (PI, Instituto Potosino de Investigacion y Tecnologia), **DR Smart** and J Belnap. UCMEXUS (\$25,000).
- 2004-2005 Evaluation and Successful Propagation of Grapevine Nursery Stock. **DR Smart** (PI) and MA Walker, Fruit Tree, Nut Tree & Grapevine Improvement Advisory Board (\$50,000).
- 2003-2006: Spatial Variation in Soil Chemical and Physical Properties and Precision Viticulture in Two Carneros Pinot Noir Vineyards. **DR Smart** (PI), J-J Lambert and RE Plant. USDA CSREES Western Viticulture Consortium/American Vineyard Foundation (AVF)/California Competitive Grants Program for Research in Viticulture and Enology (CCGPRVE) Deere Inc. Division of Global Ag Services (\$142,500).
- 2003-2006 Physiological Effects of Fruiting Cane Severance on Raisin Grapes, MW Fidelibus (PI) and **DR Smart**. California Raisin Advisory Board (\$102,900)
- 2003-2005: Conservation Tillage of Cover Crops as a Means of Improving Carbon Storage in California Vineyards. **DR Smart** (PI) and KL Steenwerth USDA-ARS, CDFA, Kearney Foundation Soil Science (\$92,200).
- 2002-2007: Temporal and Spatial Patterns of Water and Nutrient Availability, and the Physiological Capacity of Root Nutrient Acquisition in Dry Soils Under Deficit Irrigation. **DR Smart** (PI) and DM Eissenstat. USDA/CSREES Western Viticulture Consortium, AVF, CCGPRVE (\$300,802).
- 2002-2004 Seasonal Patterns of Root Proliferation and Dynamics of *Vitis vinifera* cv Merlot under Different Levels of Irrigation. DM Eissenstat (PI) and **DR Smart** USDA CSREES Western Viticulture Consortium/AVF/CCGPRVE (\$96,400).
- 2002-2004 Carbon Flow Through Root and Microbial Respiration in Vineyards and Adjacent Oak Woodland Grassland Communities. **DR Smart** (PI). Kearney Foundation of Soil Science (\$68,300).
- March 2001: Gaspar de Portola Fellowship in Catalan Studies. **DR Smart**. University of California Berkeley, Area International Exchange Studies Program, (\$1,500).
- 2000-2004: Evaluation and Successful Propagation of Grapevine Nursery Stock. MA Walker (PI) and **DR Smart**. Fruit Tree, Nut Tree Grapevine Improvement Advisory Board (\$365,000)
- 1999-2001: Physiological Role of Rootstocks in Determining Grapevine Vigor. **DR Smart** (PI). USDA/CSREES Western Viticulture Consortium/AVF/CCGPRVE (\$104,800).



- 1999-2003: Nitrate Assimilation Under Elevated CO<sub>2</sub> and Leaf Nitrous Oxide Emissions. AJ Bloom (PI) and **DR Smart**, University of California at Davis. National Science Foundation Ecological and Evolutionary Physiology, (\$459,479).
- March, 1996: Use of Stable Isotope Dilution Methodology for Soil Nitrogen Cycling Research in Mediterranean Ecosystems: A short course. **DR Smart** and J Romanya, Universitat de Barcelona, Comitat per a Universitats i Departaments de Recerca, Barcelona, Spain (\$3,300.00).
- 1994-1996: Carbon Dioxide Fertilization of Protected Cultivation Systems Under Mediterranean Climates. Dr. Josep Penuelas (PI) and **DR Smart**, CREAM, Universitat Autònoma de Barcelona, Dr. Robert Save, Institut de Tecnologia i Recerca Agroalimentàries, and Joan Llibre, Carburos Metalicos S.A. Instituto Nacional de Investigaciones Agrarias (\$110,000).
- 1994-1996: Influence of Elevated CO<sub>2</sub> on Rhizosphere Carbon and Nitrogen Relations Among Several Native Mediterranean Plant Taxa. Postdoctoral Research Fellow awarded to **DR Smart**, Ministerio de Educacion y Ciencia, Madrid, Spain (\$64,000).
- 1991-1994: Carbon and Nitrogen Use Efficiency of Wheat in Contained Environment Ecosystems. B Bugbee (PI), **DR Smart** and J Stark, NASA Life Sciences, Contained Environment Life Support Systems Program (\$440,000).

#### Non-Peer-Reviewed Conference Proceedings:

- Wang, J, D Hui, T Jima, S Bhattarai, S Dennis, C Stockert, **DR Smart**, T Sammis, D Miller and C Reddy (2012) Eddy-covariance and chamber measured greenhouse gas emissions from a commercial cornfield. Proceedings of the 20th Symposium on Boundary Layers and Turbulence. 9-13 July 2012, Boston, MA
- Smart, DR**, M del Mar Alsina, T Bauerle and V Zufferey (2011) Can rootstocks really confer drought tolerance upon grapevine scions? A case study of Merlot on two rootstocks. Proceedings AVSO PGIBSA, *Below Ground Management for Quality and Productivity*, July 24-25, Mildura Australia
- Smart, DR**, A Breazeale, J Viers, J Gallucci and R Plant. (2008) Anthropogenic intervention in shaping terroir in a California Pinot Noir vineyard. *Proceedings of the VII<sup>th</sup> International Terroir Congress*, Nyon (Switzerland) May 19 – 23, 2008.
- Smart DR**, PD Brooks and AJ Bloom (1997) Leaf N<sub>2</sub>O emission by a vascular land plant? *Proceedings Applied Isotope Geochemistry II*, Calgary, Canada.
- Bloom AJ and **DR Smart** (1987) Species variation in the absorption of mineral nitrogen. *Proceedings of the Hydroponic Society of America* **8**:104-113.

Abstracts (1989-2010):

- 1989 **Smart, D.R.** and A.J. Bloom. Ammonium uptake shows limited hysteresis following exposure to cold temperatures in wild, cold tolerant tomato. American Society of Plant Physiologists, Toronto Canada.
- 1989 Bloom, A.J., G. Koch, K. Kosola, and **D.R. Smart**. Induction of  $\text{NO}_3^-$  absorption: fact or artifact? American Society of Plant Physiologists, Toronto Canada.
- 1991 **Smart, D.R.** and A.J. Bloom. Increased  $\text{NO}_3^-$  absorption and  $\text{H}^+$  translocation under  $\text{NH}_4^+$  exposure. American Society of Plant Physiologists, Albuquerque, NM.
- 1992 **Smart, D.R.**, K. Ritchie, J.M. Stark, and B. Bugbee. Influence of nitrogen form and level upon denitrifying enzyme activity on wheat roots grown under high  $\text{CO}_2$  environments. Ecological Society of America, Hawaii.
- 1993 Ritchie, K., J. Stark, **D. R. Smart**, and B. Bugbee. The effect of  $\text{NH}_4^+$  and  $\text{NO}_3^-$  based nutrient solutions on competition between rhizosphere nitrifying and denitrifying bacteria. American Society of Agronomy, Cincinnati, OH.
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