

I. PERSONAL DATA

Name: Robert L. Houtz

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II. EDUCATION

Doctorate of Philosophy, 1984

Institution: Michigan State University, East Lansing, MI 48824
Major: Horticulture
Dissertation Title: Stimulation of Growth and Photosynthetic Carbon Metabolism in *Chlamydomonas reinhardtii* with Triacontanol

Master of Science, 1980

Institution: Michigan State University, East Lansing, MI 48824
Major: Horticulture
Thesis Title: Development and Characterization of an *In Vitro* System Responsive to 1-Triacontanol

Bachelor of Science (magna cum laude), 1977

Institution: University of Florida, Gainesville, FL 32611
Major: Horticulture

III. PROFESSIONAL EMPLOYMENT

Professor and Chair, Department of Horticulture, University of Kentucky, (11.33% research, 2% teaching, 5% service, 81.67% administration), May 1, 2009-present.

Professor of Horticulture, University of Kentucky, Department of Horticulture, (70% research, 20% teaching, 10% administration), July 1, 1999-2009

Associate Professor of Horticulture, University of Kentucky, Department of Horticulture and Landscape Architecture, (85% research, 15% teaching), December 1, 1990-June 30, 1999

Assistant Professor of Horticulture, University of Kentucky, Department of Horticulture and Landscape Architecture, (90% research, 10% teaching), January 1, 1985 - November 30, 1990

Graduate Research Assistant, Michigan State University, Department of Horticulture, September 1977 - September 1984

IV. **RESEARCH**

Research Area: Structure/function studies and post-translational modifications in ribulose-1,5-bisphosphate carboxylase/oxygenase; Chloroplast-localized co- and post-translational protein processing; Enzymology of SET domain protein N-methyltransferases. Functional significance of calmodulin methylation and calmodulin N-methyltransferase.

Significant Research Accomplishments:

- Provided evidence for the necessity of the N-terminal region of the large subunit of ribulose bisphosphate carboxylase/oxygenase for catalytic activity and identified this same region as the location of catalytic-dependent conformational changes.
- Discovered all of the known post-translational modifications in the large subunit of ribulose bisphosphate carboxylase/oxygenase, including N-terminal removal of Met-1 and Ser-2, acetylation of Pro-3, and methylation of Lys-14.
- Provided the first evidence for species diversity in the post-translational modifications of the large subunit of ribulose bisphosphate carboxylase/oxygenase.
- Discovered the chloroplast-localized enzymatic activity responsible for one of the post-translational modifications in the large subunit of ribulose bisphosphate carboxylase/oxygenase.
- Provided the first reported DNA and protein sequence for a protein (lysine) N-methyltransferase enzyme.
- Discovered chloroplast-localized eukaryotic peptide deformylase
- Provided one of the first structural determinations of a SET domain protein methyltransferase.
- Demonstrated the potential commercial utility of peptide deformylase and peptide deformylase inhibitors as a new platform for selectable marker and broad-spectrum herbicide technology.
- Discovered the DNA and protein sequence for calmodulin lysine methyltransferase.

Patents (10):

#8,417,498, #7,445,923, Crystallization and Structure of a Plant Peptide Deformylase. Inventor, Robert L. Houtz, Co-Inventors, David Rodgers, Lynnette M. A. Dirk, and Mark Williams, issued April 9, 2013 and November 4, 2008.

#8,138,309, Modified Rubisco Large Subunit N-methyltransferase Useful for Targeting Molecules to the Active-site Vicinity of Ribulose-1, 5-Bisphosphate. Inventor: Robert L. Houtz, issued March 20, 2012.

#7,745,693, #7,419,815, #6,730,634, Inhibitors of Plant Peptide Deformylase for use as Broad-Spectrum Herbicides and Methods for Identifying the Same. Inventors Robert L. Houtz, Lynnette Dirk, and Mark Williams, issued June 29, 2010, September 2, 2008, and May 4, 2004.

#6,245,541, #5,866,394, Isolated Spinach Ribulose-1,5-Bisphosphate Carboxylase/Oxygenase Large Subunit Epsilon N-Methyltransferase and Method of Inactivating Ribulose-1,5-Bisphosphate Epsilon N-Methyltransferase Activity. Inventor, Robert L. Houtz, issued June 12, 2001 and June 1, 1999.

#5,866,394, #5,723,752, Cloning and developmental expression of pea ribulose-1,5-bisphosphate carboxylase/oxygenase large subunit epsilon N-methyltransferase. Inventor, Robert L. Houtz, issued February 2, 1999 and March 3, 1998.

Grants:

Date	Agency		Title	Duration	Amount	Status
Nationally Competitive - Extramural						
07/03	DOE OER Basic Energy Science Energy Bioscience (2 yr extension with \$50,000 new funds)	PI: R. Houtz Co-PI: L. Dirk	Mechanism and Signi- ficance of Post-Trans- lational Modifications in the Large and Small Subunits of Ribulose Bisphosphate Carboxylase/Oxygenase	5 yrs	\$380,000.	Funded 7/03-6/08
07/02	NSF (with 2 yr no cost extension,	PI: R. Houtz, Co-PIs: L. Dirk M. Williams and A. Francis- Miller	Chloroplast-localized N- terminal protein processing by peptide deformylase	3 yrs	\$300,000.	Funded 1/03-12/08
7/98	DOE OER Basic Energy Science Energy Bioscience (renewal)	PI: R Houtz Co-PI: none	Mechanism and Signi- ficance of Post-Trans- lational Modifications in the Large and Small Subunits of Ribulose Bisphosphate Carboxylase/Oxygenase	3 yrs	\$264,255	Funded 1/99-12/02
6/95	DOE OER Basic Energy Science Energy Bioscience (renewal)	PI: R Houtz Co-PI: none	Mechanism and Signi- ficance of Post-Trans- lational Modifications of Ribulose Bisphosphate Carboxylase/Oxygenase	3.5 yrs	\$264,119	Funded 6/95-12/98
6/92	USDA/ARS Cooperative Agreement	Co-PIs: R Houtz and S Crafts- Brandner	A Combination of Nuclear and Chloroplast Factors Determines Protein Stability in Tobacco Chloroplasts	2 yrs	\$37,438	Funded 7/93-6/95
6/91	DOE Competitive Grants Program Division of Energy Biosciences	PI: R Houtz Co-PI: none	Mechanism and Signi- ficance of Post-Trans- lational Modifications in the Large Subunit of Ribulose Bisphosphate Carboxylase/Oxygenase	3 yrs	\$269,000	Funded 7/92-6/95
12/88	USDA Competitive Grants Program (Photosynthesis)	PI: R Houtz Co-PI: none	Mechanism and Signi- ficance of Post-Trans- lational Modifications in the Large Subunit of Ribulose Bisphosphate Carboxylase/Oxygenase	2 yrs	\$100,000	Funded 7/89-6/91
Nationally Competitive - Extramural - Equipment						
1/01	NSF EPSCOR, Major Research Equipment Grant	PI: T Vanaman Co-PI: R Houtz, D Rodgers, T Creamer, P Speilman, M Oliveira	Center for Proteomics	3 yrs	\$1,270,033	Funded 1/02-12/05

Date	Agency		Title	Duration	Amount	Status
Competitive - Internal - Equipment						
5/96	UK, Major Research Equipment Grant		IASys Optical Biosensor System (I was the lead PI on this application which had 7 other Co-PIs)		\$87,035	Funded
9/89	UK, Major Research Equipment Grant		Low Pressure Liquid Chromatography System		\$4,550	Funded
9/88	UK, Major Research Equipment Grant		High Performance Liquid Chromatography System		\$6,780	Funded
9/87	UK, Major Research Equipment Grant		Ultra-Low Freezer, Liquid Scintillation Counter		\$18,450	Funded
Competitive – Internal/local – Projects						
10/07	KSEF	PI: R. Houtz Co-PIs: MA Williams, Horticulture	Isolation and Identification of Plant-Specific Peptide Deformylase Inhibitors from Soil Micro-organisms for Use as Broad-Spectrum Herbicides and Selectable Markers	1 yr	\$19,976	Funded 10/07- 09/08
10/06	UK NPA (Natural Products Alliance)	PI: R. Houtz Co-PIs: MA Williams, Horticulture; R B Grossman, Chemistry; EM D'Angelo, Plant and Soil Science; and DW Rodgers, Biochemistry	Isolation and Identification of Plant-Specific Peptide Deformylase Inhibitors from Soil Micro-organisms for Use as Broad-Spectrum Herbicides and Selectable Markers.	2 yr	\$40,000	Funded 01/07- 12/08
11/04	KTRDC	PI: R. Houtz	Development and Utilization of Rubisco LSMT as a Molecular Vehicle for Targeting Enzymes to Rubisco	2 yrs	\$100,000.	Funded 06/05- 07/07
7/02	USDA New Crop Opportunities	PI: R Houtz Co-PI: B Rowell	Evaluation of High-Tunnels as a Seasonal Extending Technology	3 yrs	\$60,020	Funded 7/02-6/05
7/01	KTRDC	PI: M Williams Co-PI: R Houtz	Peptide Deformylase in Tobacco: A Novel Herbicide Target Amenable to Genetically Engineered Tolerance	2 yrs	\$103,256	Funded 7/01-6/03

Date	Agency		Title	Duration	Amount	Status
6/96	UK, Office of the Vice Chancellor for Research & Graduate Studies		Member, Plant Biotechnology Initiative (joint proposal, majority effort held by Co-Chairs: Maelor. Davies, Director, Tobacco & Health Research Institute; and Dr. George Wagner, Agronomy.)	2 yrs	\$100,000	Funded
Internal						
8/02	Office of the Vice President for Research	PI: R Houtz	Bridge Funding for graduate research assistantship stipends	1 yr	\$18,000	Funded
Hatch Projects						
7/02-7/07			Mechanism and Significance of Post-Translational Modifications in the Large and Small Subunits of Ribulose Bisphosphate Carboxylase/Oxygenase			Approved
7/95-6/00			Mechanism and Significance of Post-Translational Modifications in the Large and Small Subunits of Ribulose Bisphosphate Carboxylase/Oxygenase			Approved
7/90-6/95			Influence of Lys-14 methylation of stability of Rubisco LS			Approved
7/85-6/90			Relationships among light, photosynthetic CO ₂ assimilation, and ribulose-1,5-bisphosphate carboxylase			Approved
Non-Competitive						

Date	Agency	PI:	Title	Duration	Amount	Status
09/14-10/16	Kentucky Department of Agriculture, Agriculture Development Board	Robert L. Houtz	UK Viticulture/Enology Program	2 yrs	\$441,301.00	Funded
09/13-9/14	Kentucky Department of Agriculture, Agriculture Development Board	Robert L. Houtz	Center for Crop Diversification	1 yr	\$113,347.00	Funded
06/09 – 07/13	Special Appropriations Grant, USDA NIFA,	Robert L. Houtz	Crop Diversification and Biofuel Research and Education	4 yrs	\$978,052.00	Funded
7/98-8/01	Monsanto Corp		Construction and Evaluation of Transgenic Wheat and Maize Plants Expressing Full-Length and Truncated Forms of Pea Rubisco LSMT	2 yrs	\$26,600	Funded
9/90-9/92	AIRCO Carbon Dioxide		<i>In Situ</i> Field Fertilization with CO ₂	2 yrs	\$3,000	Funded
9/85-9/87	Kentucky Vegetable Growers Association		Optimization of Factors Affecting Bell Pepper Production	3 yrs	\$1,500	Funded

V. PUBLICATIONS

*student, #post-doc

A. Research Papers

Ali, I., Ramage, H., Boehm, D., Dirk, L. M., Sakane, N., Hanada, K., Pagans, S., Kaehlcke, K., Aull, K., Weinberger, L., Trievel, R., Schnoelzer, M., Kamada, M., **Houtz, R.**, and Ott, M. (2016) The HIV-1 Tat Protein Is Monomethylated at Lysine 71 by the Lysine Methyltransferase KMT7. *J Biol Chem* 291, 6240-16248.

Fick, R. J., Kroner, G. M., Nepal, B., Magnani, R., Horowitz, S., **Houtz, R. L.**, Scheiner, S., and Trievel, R. C. (2016) Sulfur-Oxygen Chalcogen Bonding Mediates AdoMet Recognition in the Lysine Methyltransferase SET7/9, *ACS Chemical Biology* 11, 748-754.

Haziza, S., Magnani, R., Lan, D., Keinan, O., Saada, A., HersHKovitz, E., Yanay, N., Cohen, Y., Nevo, Y., **Houtz, R. L.**, Sheffield, V. C., Golan, H., and Parvari, R. (2015) Calmodulin Methyltransferase Is Required for Growth, Muscle Strength, Somatosensory Development and Brain Function, *PLoS Genetics* 11, e1005388.

Scott Horowitz, Upendra Adhikari, Lynnette M. A. Dirk, Paul A Del Rizzo, Ryan A. Mehl, **Robert L. Houtz**, Hashim M. Al-Hashimi, Steve Scheiner, and Raymond C. Trievel. (2014). Manipulating

Unconventional CH-based Hydrogen Bonding in a Methyltransferase via Non-Canonical Amino Acid Mutagenesis. **ACS Chemical Biology**. <http://dx.doi.org/10.1021/cb5001185>.

Horowitz, S., Dirk, L.M., Yesselman, J.D., Nimtz, J.S., Adhikari, U., Mehl, R.A., Scheiner, S., **Houtz, R.L.**, Al-Hashimi, H.M., and Trievel, R.C. (2013). Conservation and functional importance of carbon-oxygen hydrogen bonding in AdoMet-dependent methyltransferases. **Journal of the American Chemical Society** 135:15536-15548.

Banerjee, J., Sahoo, D.K., Dey, N., **Houtz, R.L.**, and Maiti, I.B. (2013). An intergenic region shared by At4g35985 and At4g35987 in *Arabidopsis thaliana* is a tissue specific and stress inducible bidirectional promoter analyzed in transgenic *Arabidopsis* and tobacco plants. **PLoS One** 8:e79622.

Banerjee, J., Magnani, R., Nair, M., Dirk, L.M., DeBolt, S., Maiti, I.B., and **Houtz, R.L.** (2013). Calmodulin-mediated signal transduction pathways in *Arabidopsis* are fine-tuned by methylation. **The Plant Cell** 25:4493-4511.

Magnani, R., Chaffin, B., Dick, E., Bricken, M.L., **Houtz, R.L.**, and Bradley, L.H. (2012). Utilization of a calmodulin lysine methyltransferase co-expression system for the generation of a Combinatorial library of post-translationally modified proteins. **Protein expression and purification** 86:83-88.

Magen, S., Magnani, R., Haziza, S., Hershkovitz, E., Houtz, R., Cambi, F., and Parvari, R. (2012) Human calmodulin methyltransferase: expression, activity on calmodulin, and Hsp90 dependence. **PLoS One** 7, e52425.

Whitney, S. M., **R. L. Houtz**, and Alonso, H. (2011). Advancing our understanding and capacity to engineer nature's CO₂-sequestering enzyme, Rubisco. **Plant Physiol.** 155(1): 27-35.

Del Rizzo, Paul A., Couture, Jean-Francois, Dirk, Lynnette M. A., Strunk, Bethany S., Roiko, Marijo S., Brunzelle, Joseph S., **Houtz, Robert L.**, and Trievel, Raymond C. (2010). SET7/9 catalytic mutants reveal the role of active site water molecules in lysine multiple methylation. **J. Biol. Chem.** 285(41): 31849-31858.

Magnani, R[#], Dirk, L. M., Trievel, R. C., and **Houtz, R. L.** (2010). Calmodulin methyltransferase is an evolutionarily conserved enzyme that trimethylates Lys-115 in calmodulin. **Nat. Commun.** 1:43.

Whitney, S. M., Kane, H. J., **Houtz, R. L.**, and Sharwood, R. E. (2009). Rubisco oligomers composed of linked small and large subunits assemble in tobacco plastids and have higher affinities for CO₂ and O₂. **Plant Physiol.** 149(4): 1887-1895.

Raunser, S., Magnani, R[#], Huang, Z., **Houtz, R. L.**, Trievel, R. C., Penczek, P. A., and Walz, T. (2009). Rubisco in complex with Rubisco large subunit methyltransferase. **Proc. Natl. Acad. Sci. USA** 106(9): 3160-3165.

Couture, J. F., Dirk, L. M., Brunzelle, J. S., **Houtz, R. L.**, and Trievel, R. C. (2008). Structural origins for the product specificity of SET domain protein methyltransferases. **Proc. Natl. Acad. Sci. USA.** 105(52): 20659-20664.

Dinkins, R. D., Majee, S. M., Nayak, N. R., Martin, D., Xu, Q., Belcastro, M. P., **Houtz, R. L.**, Beach, C. M., and Downie, A. B. (2008). Changing transcriptional initiation sites and alternative 5'- and 3'-splice site selection of the first intron deploys *Arabidopsis* protein isoaspartyl methyltransferase2 variants to different subcellular compartments. **Plant J.** 55(1): 1-13.

Dirk, L. M., Schmidt, J. J., Cai, Y., Barnes, J. C., Hanger, K. M., Nayak, N. R., Williams, M. A., Grossman, R. B., **Houtz, R. L.**, and Rodgers, D. W. (2008). Insights into the substrate specificity of plant peptide deformylase, an essential enzyme with potential for the development of novel biotechnology applications in agriculture. **Biochem J.** 413(3): 417-427.

Houtz, Robert L., R. Magnani[#], N. R. Nayak[#], and L. M. A. Dirk. (2008). Co- and post-translational modifications in Rubisco: unanswered questions. **J. Exp. Bot.** 59(7): 1635-1645.

Magnani, R[#], N. R. Nayak[#], M. Mazarei, L. M. Dirk, and **R. L. Houtz.** (2007). Polypeptide

- substrate specificity of PsLSMT. A set domain protein methyltransferase. **J. Biol. Chem.** 282:27857-27864.
- Dirk, L. M. A., E. M. Flynn*, K. Dietzel*, J.-F. Couture, R. C. Trievel, and **R. L. Houtz**. (2007). Kinetic manifestation of processivity during multiple methylations catalyzed by SET-domain protein methyltransferases. **Biochemistry** 46:3905-3915.
- Hou, Cai-Xia, Dirk, Lynnette M.A., Pattanaik, Sitakanta, Das, Narayan C., Maiti, Indu B., **Houtz, Robert L.**, and Williams, Mark A. (2007). Plant Peptide Deformylase: A Novel Selectable Marker and Herbicide Target Based on Essential Co-Translational Chloroplast Protein Processing. **Plant Biotechnology** 5:275-281 (cover article).
- Shepherd, R.W., Bass, W. T., **Houtz, R.L.**, and Wagner, G.J. (2005). Phylloplanins of tobacco are defensive proteins deployed on aerial surfaces by short glandular trichomes. **Plant Cell** 17: 1851-1861.
- Houtz, Robert L.** and Portis, Archie R. Jr. (2003) The life of ribulose-1,5-bisphosphate carboxylase/oxygenase – post-translational facts and mysteries. Minireview. **Archives Biochemistry and Biophysics**, 414:150-158, special issue on C-fixing enzymes.
- Trievel, Raymond C., Flynn E.M*, **Houtz, Robert L.**, and Hurley, J.H. (2003). Mechanism of multiple lysine methylation by the SET domain enzyme Rubisco LSMT. **Nature Structural Biology**, 10:545-552.
- Dinkins, Randy D., Conn, Heather M., Dirk, Lynnette M.A., Williams, Mark A., and **Houtz, Robert L.** (2003). The *Arabidopsis thaliana* peptide deformylase 1 protein is localized to both mitochondria and chloroplasts. **Plant Science**, 165:751-758.
- Trievel, Raymond C., Beach, Bridgette M., Dirk, Lynnette, M.A., **Houtz, Robert L.** and Hurley, James H. (2002). Structure and catalytic mechanism of a SET domain protein methyltransferase. **Cell** 111:91-103 (cover article, with depiction of the active-site of pea Rubisco LSMT).
- Dirk, Lynnette M.A., Mark A. Williams, and **Robert L. Houtz**. (2002). Specificity of chloroplast-localized peptide deformylases as determined with peptide analogs of chloroplast-translated proteins. **Archives of Biochemistry and Biophysics** 406:135-141.
- Dirk, Lynnette, Mark A. Williams, and **Robert L. Houtz**. (2001). Eukaryotic peptide deformylases: Nuclear-encoded and chloroplast-targeted enzymes in *Arabidopsis thaliana*. **Plant Physiology** 127:97-107 (featured article).
- Ying, Z.[#], Mulligan, R.M., Janney, J., Royer, M., and **Houtz, R.L.** (1999). Rubisco SSMT and LSMT: Related [∇]N- and N-methyltransferases that methylate the large and small subunits of Rubisco. **Journal of Biological Chemistry** 274:36750-36756.
- Kumar, G.N.M., **Houtz, R.L.** and Knowles, N.R. (1999). Age-induced protein modifications and increased proteolysis in potato seed-tubers. **Plant Physiol.** 119:89-99.
- Keathley, C., Potter, D.A., **Houtz, R.L.** (1999). Freezing-altered palatability of Bradford pear to Japanese beetle: evidence for decompartmentalization and enzymatic degradation of feeding deterrents. **Entomologia Experimentalis et Applicata** 90:49-59.
- Zheng, Q. *, Simel, E.J. *, Klein, P.E., Royer, M.T., and **Houtz, R.L.** (1998). Expression, purification, and characterization of recombinant ribulose-1,5-bisphosphate carboxylase/oxygenase large subunit N-methyltransferase. **Protein Expression and Purification** 14:104-112.
- Mazarei, M.[#], Ying, Z.[#], and **Houtz, R.L.** (1998). Functional analysis of the Rubisco large subunit N-methyltransferase promoter from tobacco and its regulation by light in soybean hairy roots. **Plant Cell Reports** 17:907-912.
- Kester, S.T., Geneve, R.L. and **Houtz, R.L.** (1997). Priming and accelerated aging affect L-iso-aspartyl methyltransferase activity in tomato (*Lycopersicon esculentum* Mill.) seed. **J. Experimental Botany** 48:943-949.

- Ying, Z.[#], Janney, N., and **Houtz, R.L.** (1996). Organization and characterization of the ribulose-1,5-bisphosphate carboxylase/oxygenase large subunit N-methyltransferase gene in tobacco. **Plant Mol. Biol.** 32(4):663-672.
- Wang, P.^{*}, Royer, M., and **Houtz, R.L.** (1995). Affinity purification of Ribulose-1,5-bisphosphate carboxylase/oxygenase large subunit ⁰N-methyltransferase **Protein Expression and Purification** 6:528-536.
- Klein, R.R. and **Houtz, R.L.** (1995). Cloning and developmental expression of pea ribulose-1,5-bisphosphate carboxylase/oxygenase large subunit N-methyltransferase **Plant Mol. Biol.** 27:249-261.
- Houtz, R.L.**, L. Poneleit^{*}, S.B. Jones^{*}, M. Royer, J.T. Stults. (1992). Post-translational modifications in the amino-terminal region of the large subunit of ribulose-1,5-bisphosphate carboxylase/oxygenase from several plant species. **Plant Physiol.** 98:1170-1174.
- Houtz, R.L.**, M. Royer, M.E. Salvucci. (1991). Partial purification and characterization of ribulosebisphosphate carboxylase/oxygenase large subunit N-methyltransferase. **Plant Physiol.** 97:913-920.
- Houtz, R.L.**, R.M. Mulligan. (1991). Catalytic protection of tryptic sensitive sites in the large subunit of ribulosebisphosphate carboxylase/oxygenase. **Plant Physiol.** 96:335-339.
- Knavel, D.E., **R.L. Houtz.** (1990). Characteristics of 'Main Dwarf' short-internode muskmelon genotype as compared with its normal-internode "parent" and F₁ hybrid ('Main Dwarf' x 'Mainstream'). **HortScience.** 25:1277-1279.
- Houtz, R.L.**, J. Stults, R.M. Mulligan, N.E. Tolbert. (1989). Post-translational modifications in the large subunit of ribulose bisphosphate carboxylase/oxygenase. **Proc. Natl. Acad. Sci. USA** 86:1855-1859.
- Biernbaum, J.A., **R.L. Houtz**, S.K. Ries. (1988). Field studies with crops treated with colloiddally dispersed triacontanol. **J. Amer. Soc. Hort. Sci.** 113:679-684.
- Mulligan, R.M., **R.L. Houtz**, N.E. Tolbert. (1988). Reaction-intermediate analogue binding by ribulose bisphosphate carboxylase/oxygenase causes specific changes in proteolytic sensitivity: The amino-terminal residue of the large subunit is acetylated proline. **Proc. Natl. Acad. Sci. USA** 85:1513-1517.
- Houtz, R.L.**, R.O. Nable, G.M. Cheniae. (1988). Evidence for effects on the *in vivo* activity of ribulose-bisphosphate carboxylase/oxygenase during development of Mn toxicity in tobacco. **Plant Physiol.** 86:1143-1149.
- Nable, R.O., **R.L. Houtz**, G.M. Cheniae. (1988). Early inhibition of photosynthesis during development of Mn toxicity in tobacco. **Plant Physiol.** 86:1136-1142.
- Archbold, D.D., **R.L. Houtz.** (1988). Photosynthetic characteristics of strawberry plants treated with paclobutrazol or flurprimidol. **HortScience.** 23(1):200-202.
- Sterling, T.M., **R.L. Houtz**, A.R. Putnam. (1987). Phytotoxic exudates from velvet leaf (*Abutilon theophrasti*) glandular trichomes. **Amer. J. Bot.** 74(4):543-550.
- Cockfield, S.D., D.A. Potter, **R.L. Houtz.** (1987). Chlorosis and reduced photosynthetic CO₂ assimilation of *Euonymus fortunei* infested with *Euonymus* scale (Homoptera: Diaspididae). **Environ. Entomol.** 16:1314-1318.
- Houtz, R.L.**, S.K. Ries, N.E. Tolbert. (1985). Effect of triacontanol on *Chlamydomonas*. Stimulation of growth and photosynthetic CO₂ assimilation. **Plant Physiol.** 79:357-364.
- Houtz, R.L.**, S.K. Ries, N.E. Tolbert. (1985). Effect of triacontanol on *Chlamydomonas*. II. Specific activity of ribulose-bisphosphate carboxylase/oxygenase, ribulose-bisphosphate concentration, and characteristics of photorespiration. **Plant Physiol.** 79:365-370.

Houtz, R.L. and S.K. Ries. (1983). Triacontanol levels in ascending sugar maple sap. **HortScience**. 18(1):101-102.

Ries, S.K. and **R.L. Houtz**. (1983). Triacontanol as a plant growth regulator. **HortScience** 18(5):654-662.

B. Book Chapters

1. Dirk, L. M. A., R. C. Trievel, and **R. L. Houtz**. 2006. Non-Histone Protein Lysine Methyltransferases - structure and catalytic roles p. 179-229. In Fuyu Tamanoi and Steven Clarke (ed.), *The Enzymes*. Elsevier Academic Press.

C. Conference Proceedings

1. **Robert L. Houtz**, Lynnette M.A. Dirk, Mark A. Williams, and Brent W. Meier. 2000. Primary and secondary structural elements influence the susceptibility of the Rubisco small subunit to methylation by Rubisco small subunit methyltransferase. Proceedings of the 5th International Jubilee Conference on the Role of Formaldehyde in Biological Systems. Methylation and Demethylation Processes. October 9-13, 2000. Sopron, Hungary. pp. 31.
2. **Robert L. Houtz**, Brent Meier, Lynnette Dirk, and Malcolm Royer. 1999. Characterization and functional significance of ¹⁴N-methylmethionine formation in the small subunit of Rubisco. Proceedings of the 6th International Congress on Amino Acids. Bonn, Federal Republic of Germany. August 3-7, 1999. Amino Acids Vol. 17:84 #2.
3. Ying, Z.[#], Mulligan, R.M., Janney, N., Royer, M., and **Houtz, R.L.** 1998 Related ¹⁴N- and ¹⁵N-methyltransferases methylate the large and small subunits of Rubisco. *Acta Biologica Hungarica* 49:173-184.
4. Ying, Z.[#], Mulligan, R.M., Janney, J., Royer, M., and **Houtz, R.L.** 1998 "Chloroplast-localized protein N-methyltransferases." Proceedings of the 4th International Conference on the Role of Formaldehyde in Biological Systems. Methylation and Demethylation Processes. July 1-4, 1998, Budapest, Hungary. *Acta Biologica Hungarica* 49:173-184.
5. **Houtz, R.L.**, M. Royer. 1990. "N-terminal processing of the large subunit of ribulose-P₂ carboxylase/oxygenase." Proceedings of the XXIII International Horticultural Congress. Florence, Italy. Vol. 2, 4154.
6. **Houtz, R.L.**, Putnam, A.R. and T.M. Sterling. 1984. Phytotoxic exudates from trichomes on the stems and petioles of velvetleaf (*Abutilon theophrasti* Medic.) plants. Proceedings of the ACS Symposium Series, "The Chemistry of Allelopathy."
7. **Houtz, R.L.** and S.K. Ries. 1982. Effect of triacontanol on starch phosphorylase and PEP carboxylase activities. Proceedings of the XXIst International Horticulture Congress. Hamburg, Germany. Vol. II. #2087.

D. Invited Presentations and/or Participation

International

- Invited Member, Editorial Board for Journal of Biological Chemistry, July 2013 – June 2018 and July 2003 - June 2008.
- Invited External Examiner, Dr. Douglas Orr, Ph.D. candidate, Australian National University, Supervisor, Professor Spencer Whitney, 2012.
- Invited Member, Scientific Advisory Board, 6th International Conference on the Role of Formaldehyde in Biological Systems – Methylation and Demethylation Processes, Hungary, Oct., 12-16 2003.
- Invited Speaker, NIAR/COE/BRAIN-RITE International Symposium on Photosynthetic CO₂-Assimilating Enzymes: Rubisco and PEPC, Nov. 30-Dec. 2, 2000, Greenpier Miki, Hyogo, Japan
- Invited Member, Scientific Advisory Board, 5th International Conference on the Role of Formaldehyde in Biological Systems – Methylation and Demethylation Processes, Sopron, Hungary, October 9-13, 2000.
- Invited Speaker, 6th International Congress on Amino Acids, Bonn, Federal Republic of Germany, August 3-7, 1999.
- Invited Speaker, 4th International Conference on the Role of Formaldehyde in Biological Systems: Methylation and Demethylation Processes, Hot Topics, Budapest, Hungary, July 1-4, 1998.
- Invited Seminar Speaker, Department of Agricultural, Food, and Nutritional Science, University of Alberta, Edmonton, Alberta, Canada. "Functional Aspects of Lys-14 Methylation in the Large Subunit of Ribulose-1,5-Bisphosphate Carboxylase/ Oxygenase." June 19-20, 1996.

Invited Presentation, First Joint USA-Mexico Symposium on Agrobiological, Molecular Physiology and Biotechnology of Crops Important to Mexican Agriculture, Cocoyoc, Mexico; Myrna I. Lopez (presenter), Malcolm Royer, and Robert L. Houtz, "Post-Translational Methylation of Lys-14 in the Large Subunit of Ribulose-1,5-bisphosphate Carboxylase/Oxygenase." November 5-9, 1995.

Invited Seminar Speaker and External Ph.D. Examiner, Department of Plant Science, University of Alberta, Edmonton, Alberta, Canada. November, 1992.

Invited Symposium Speaker, 5th Annual Meeting for Plant Biochemistry, Saltillo, Coahuila, Mexico. Post-translational modifications in the large subunit of ribulose bisphosphate carboxylase/oxygenase. Site specific methylation of Lys-14. October 13-17, 1991.

External Reviewer, Natural Sciences and Engineering Research Council (NSERC) of Canada Competitive Grants Program. 1989-present.

Invited External Examiner, Department of Plant Science, University of Alberta, Loretta Mikitel, Ph.D. candidate. Dissertation title: "Physiological and biochemical characteristics of aging in potato tubers." October, 1989.

Invited Seminar Speaker and Guest Lecturer, Department of Plant Science, University of Alberta. Post-Translational Modifications in the Large Subunit of Ribulosebisphosphate Carboxylase/Oxygenase. September 20, 1988.

National

Host and Organizer, Annual meeting of Regional Project, NC-1142 Regulation of Photosynthetic Processes, University of Kentucky, November 11, 2006.

Invited Seminar Speaker, South Dakota State University, Department of Plant Science, Chloroplast-Localized Co- and Post-Translational Protein Modifications, July 18, 2006.

Invited Seminar Speaker, Department of Plant Biology, University of Illinois, November 3, 2005. Chloroplast-localized co- and post-translational protein modifications: Structure/Function/Significance.

Invited Seminar Speaker, Virginia Tech, Department of Plant Pathology, Physiology and Weed Science, Mechanism and Significance of Post-Translational Modifications in the Large and Small Subunits of Ribulose Bisphosphate Carboxylase/Oxygenase. July 20, 2005.

Invited Seminar Speaker, Department of Biochemistry, Emory University, September 23, 2004. Chloroplast-localized co- and post-translational protein modifications: Structure/Function/Significance.

Invited Speaker, FASEB Summer Research Conference, July 10-15, 2004. Biological Methylation. Saxtons River, Vermont.

Invited Panel Review Member, DOE, Div. of Energy Biosciences grant review panel, Nov. 5-7, 2003.

Invited Seminar Speaker, Institute of Biological Chemistry, Washington State Univ., Oct. 14, 2003. Chloroplast-localized co- and post-translational protein modifications: Structure/Function/Significance.

Invited Panel Review Member, NIH reverse site visit, NIAID, Project Grant, Oldest-Old Mortality-Demographic Models and Analysis. July 29-30, 2003.

Routine Reviewer of competitive grants for USDANRI, NSF, DOE, NIH, and BARD.

Invited Seminar Speaker, Department of Horticulture, Texas A&M University, "Chloroplast-localized Co- and Post-Translational Protein Modifications: Essential Administrative Processing of Critical Information," January 2002.

Invited Seminar Speaker, Integration Photosynthesis Research Program, University of Illinois, "Post-translational Modifications of the Large and Small Subunits of Rubisco," March 2, 2000.

Invited Seminar Speaker, Department of Biochemistry, University of Nebraska, "Post-translational Modifications of the Large and Small Subunits of Rubisco," September 29, 1998.

Invited Seminar Speaker, Botany and Plant Pathology Department, Purdue University. "Post-Translational Methylation of Lys-14 in the Large Subunit of Ribulose-1,5-bisphosphate Carboxylase/Oxygenase." March 22, 1995.

Invited Seminar Speaker, Molecular and Cellular Biology Program, Ohio University, Athens, OH. "Post-Translational Modifications in the Large Subunit of Ribulose Bisphosphate Carboxylase/Oxygenase." February 21, 1994.

External Reviewer, Consortium for Plant Biotechnology Research Inc. 1994-Present.

External Reviewer, USDA/NRI, DOE, NSF Competitive Grants Programs. 1989-Present.

Invited Attendee, The N. Edward Tolbert Symposium, Michigan State University, "Photosynthetic Carbon Metabolism and Regulation of Atmospheric CO₂ and O₂." March 4-6, 1990.

Invited Attendee, Gordon Research Conference on CO₂ Fixation in Green Plants, Plymouth State College, Plymouth, NH. July 23-27, 1990.

External Reviewer, Preproposals, Program in Science & Technology Cooperation/U.S.- Cooperative Development Research Agency for International Development, National Research Council. 1990-present.

Reviewer of manuscripts submitted for publication in *HortScience*, *Journal of the American Society for Horticultural Science*, *Plant Physiology*, and *Journal of Biological Chemistry*.

Moderator, Photosynthesis Session, 1987 meetings of the American Society for Horticultural Science.

Member, Screening Committee for the 1986 American Society for Horticultural Science, Cross-Commodity Publication Award.

Invited Participant, International Conference on Crop Productivity - Research Imperatives Revisited. Boyne Highlands, Michigan. Oct. 14-18, 1985.

Regional/Local

Special Awards Judge, Intel International Science and Engineering Fair, Louisville, KY, 2002.

Invited Speaker, Fayette County Hoe'nHope Garden Club, "Biotechnology and You," February 2002.

Science Demonstration Project - 5th grade science classes (4 sessions), Strode Station Elementary School, Winchester, KY, "Electron Transport and Photosynthesis, Chemiluminescence," September 2001.

Invited Seminar Speaker, Fayette County Master Gardener Association, "Agricultural Biotechnology in the Future," January 23, 1999.

Invited Seminar Speaker, Plant Physiology/Biochemistry Molecular Biology Program, University of Kentucky. "Exploring Methylation of Lys-14 in the Large Subunit of Rubisco. April 16, 1997.

Invited Judge, Intel International Science and Engineering Fair, Botany Section, Louisville, KY. May 10-16, 1997.

Invited Judge, Central Kentucky Science Fair, Botany Section, University of Kentucky. March 30, 1996; March 22, 1997.

Invited Seminar Speaker, Monsanto, St. Louis, MO. "Functional Aspects of Lys-14 Methylation in the Large Subunit of Ribulose-1,5-Bisphosphate Carboxylase/Oxygenase." September 23, 1996.

Invited Seminar Speaker, Monsanto, St. Louis, MO. "Post-Translational Methylation of Lys-14 in the Large Subunit of Ribulose-1,5-bisphosphate Carboxylase/Oxygenase." December 19, 1995.

Invited Seminar Speaker, 25th Educational Conference and Kentucky Association of Milk, Food and Environmental Sanitarians, Louisville, KY. "Biotechnology." February 21-23, 1995.

Reviewer, Undergraduate Research Proposals, Howard Hughes Medical Institute Undergraduate Initiative Program in Biological Sciences, University of Kentucky. 1993-1994; 1997.

Invited Member and Reviewer, Technical Advising Committee of the Tobacco and Health Research Institute, Lexington, KY. 1993-1995.

Reviewer, American Society of Testing and Materials (ASTM), Special Technical Publications. June, 1990.

Selected Participant, Technology Transfer Conference. "Structure/ Function Relationships and Post-Translational Modifications in the Large Subunit of Ribulose-1,5-Bisphosphate Carboxylase/Oxygenase." University of Kentucky, 1988.

Seminar Speaker, College of Pharmacy, Medicinal Chemistry seminar series, University of Kentucky. "Light/Dark Regulation of Ribulose-bisphosphate Carboxylase/Oxygenase Activity in Muskmelon Leaves." January 29, 1987.

Seminar Speaker, Department of Horticulture, Michigan State University. "Light/Dark Regulation of Ribulosebisphosphate Carboxylase/Oxygenase Activity in Muskmelon Leaves." Oct. 7, 1986.

E. Presentations before Professional Societies (Abstracts)

N.R. Nayak, R. Magnani, L.M. Dirk and R.L. Houtz. 2006. Elucidation of consensus amino acid sequence and potential alternate substrates of rubisco large subunit methyltransferase. American Society for Biochemistry and Molecular Biology Meetings.

Dirk, Lynnette MA, Hanger, Katherine M., Cai, Yiying, Schmidt, Jack J., Barnes, Jonathan C. Williams, Mark A., Grossman, Robert B., Rodgers, David W., **Houtz, Robert L.**, 2006. Preliminary crystal structure of plant peptide deformylase, a unique potential target for broad spectrum herbicides. American Society of Plant Biologists Meetings.

EM Flynn, LMA Dirk, RC Trievel, BM Beach, JH Hurley, RL Houtz. Analysis of a structurally unique C-terminal domain of a SET domain-containing protein methyltransferase Rubisco LSMT. American Society of Biochemistry and Molecular Biology Annual Meeting. Boston, MA. June 12-16, 2004.

EM Flynn, KL Dietzel, LMA Dirk, BM Beach, JH Hurley, RC Trievel, RL Houtz. Elucidation of the Mechanism for Successive Methyl Group Transfers by SET Domain Containing Protein

- Methyltransferases. 29th FEBS Congress. Warsaw, Poland. June 26-July 1, 2004.
- Zhang C, Dirk LMA, Hanger KM, Miller A-F, Houtz RL. 2004. The pH dependence of the active site Co(II) and Co-supported catalytic activity of peptide deformylase-2 from *Arabidopsis*. 228th American Chemical Society (ACS) National Meeting. August 22-26, 2004 Philadelphia, PA, USA.
- Hanger KM, Houtz RL, Dirk LMA. 2004. Limited tryptic proteolysis of peptide deformylase generates a core protein that retains the majority of activity without a salt-requirement for solubility. American Society of Plant Biologists' (ASPB) Plant Biology 2004. July 24 - 28, 2004 Lake Buena Vista, FL, USA.
- Cai-Xia Hou, Heather M. Conn, Lynnette M.A. Dirk, Robert L. Houtz, and Mark A. Williams. Genetically Engineered Tolerance to a Peptide Deformylase Inhibitor in Tobacco. American Society of Plant Biologists Meeting. Lake Buena Vista, Florida. July 2004.
- Williams MA, Houtz RL, Dirk LMA. 2004. Peptide deformylase: Site-directed mutation directed towards engineering inhibitor resistance. American Society of Plant Biologists' (ASPB) Plant Biology 2004. July 24 - 28, 2004 Lake Buena Vista, FL, USA.
- Meier, Brent W., Zamora, Brian G., and Houtz, Robert L. 2002. Alteration of the methylation status of Rubisco by RNAi-mediated gene silencing of Rubisco LSMT. American Society of Plant Biologists. Abstract #616.
- Conn HM, Dinkins R, Dirk LMA, Williams MA, and Houtz RL. 2002. Subcellular localization of plant peptide deformylases. American Society of Plant Biologists' Plant Biology 2002. August 3-7, 2002. Denver, CO.
- Xu Q, Dirk LMA, Lowenson J, Houtz RL, Clarke S, and Downie B. 2002. An *Arabidopsis* protein isoaspartyl-methyltransferase gene, which produces two proteins through differential splicing, may function in the nucleus. American Society of Plant Biologists' Plant Biology 2002. August 3-7, 2002. Denver, CO.
- Houtz RL, Williams MA, and Dirk LMA. 2002. Specificity of chloroplast-localized peptide deformylases as determined with N-terminal peptide analogs of chloroplast-translated proteins. American Society of Plant Biologists' Plant Biology 2002. August 3-7, 2002. Denver, CO.
- Dirk LMA, and Houtz RL. 2002. Knocking out *Arabidopsis* peptide deformylase 2 has drastic consequences to plant growth. American Society of Plant Biologists' Plant Biology 2002. August 3-7, 2002. Denver, CO.
- Williams MA, Dirk LMA, and Houtz RL. 2002. Chloroplast-localized peptide deformylase: A new target for the development of novel broad-spectrum herbicides. 42nd Annual Meeting of the Weed Science Society of America, February 10-13, 2002. Reno, NV.
- Williams MA, Dirk LMA, and Houtz RL. 2001. Characterization and inhibition of chloroplast-localized peptide deformylases from *Arabidopsis thaliana*. American Society of Horticultural Science 2001 Conference and Exhibition. July 22-25, 2001. Sacramento, CA.
- Dirk LMA, Kennedy HM, Conn HM, Williams MA, and Houtz RL. 2001. Activity and inhibition of two chloroplast-localized peptide deformylases. American Society of Plant Biologists' Plant Biology 2001. July 21-25, 2001. Providence, RI.
- Lynnette M.A. Dirk, Mark A. Williams, and Robert L. Houtz. 2000. Post-translational modification of Rubisco SS: Methionine oxidation determines the methylatability of the N-terminal α -amino group? Plant Physiology Supplement #619
- Mark A. Williams, Lynnette M.A. Dirk, and Robert L. Houtz. 2000. Characterization of a chloroplast-localized peptide deformylase from *Arabidopsis thaliana*. Plant Physiology Supplement #621.
- Brent W. Meier, Malcolm Royer, and Robert L. Houtz. 1999. Characterization of Rubisco small subunit ¹⁴N-methyltransferase (Rubisco SSMT) activity in spinach chloroplast lysates. Plant Physiology Supplement #307.
- Lynnette M.A. Dirk, Malcolm Royer, Brent Meier, and Robert L. Houtz. 1999. Alterations in the penultimate amino acid residue of the processed form of the Rubisco SS: Influencing methylation by Rubisco. SSMT and SS stability. Plant Physiology Supplement #304.
- Durbin, L., Ray, M., Royer, M., Zheng, Q., and Houtz, R.L. 1997. Identification of the S-adenosyl-L-methionine binding site in pea Rubisco large subunit N-methyltransferase. Plant Physiol. 114:149(706).
- Kumar, G.N.M., Knowles, N.R., and Houtz, R.L. 1997. Further studies on protein degradation in aging potato tubers. Plant Physiol. 114:152(725).
- Zheng, Q., Royer, M., and Houtz, R.L. 1997. Characterization of the interaction between Rubisco and Rubisco large subunit N-methyltransferase. Plant Physiol. 114:211(1062).
- Ying, Z., Janney, N., and Houtz, R.L. 1996. Molecular rationale for the absence of methylation at lysyl residue 14 in the large subunit of spinach rubisco. Plant Physiol. 111:93(343).
- Zheng, Q. and Houtz, R.L. 1996. Investigations of the interaction between pea rubisco LSMT and spinach rubisco using bifunctional cross-linking reagents. Plant Physiol. 111:93(344).

- Kumar, G.N.M., Knowles, N.R., and Houtz, R.L. 1996. Mechanisms of protein degradation in aging potato tubers. *Plant Physiol.* 111:103(402).
- Kester, S.T., Geneve, R.L. and Houtz, R.L. 1996. Priming and accelerated aging affect L-isoaspartyl methyltransferase activity in tomato seed. *HortScience* 31:632(391).
- Zheng, Q., Simel, E.J., Klein, P.E. and Houtz, R.L. 1995. Functional expression of pea rubisco in *Escherichia coli*. *Plant Physiol.* 108:72(321).
- Ying, Z., Janney, N. and Houtz, R.L. 1995. Isolation and characterization of the rubisco LSMT gene in tobacco. *Plant Physiol.* 108:135(701).
- Wang, J., Klein, R.R. and Houtz, R.L. 1995. Transformation of *Arabidopsis thaliana* with a pea rubisco LSMT cDNA. *Plant Physiol.* 108:151(798).
- Klein, R.R. and R.L. Houtz. 1994. Cloning and expression of Rubisco large subunit methyltransferase gene from pea. *Plant Physiol.* 105:85(438).
- Houtz, R.L. and Royer, M. 1994. Characterization of the effects of methylation of Lys-14 in the large subunit of spinach Rubisco. *Plant Physiol.* 105:88(456).
- Houtz, R.L., Wang, P., and Royer, M. 1993. Protein amino acid sequence of ribulose-1,5-bisphosphate carboxylase/oxygenase large subunit N-methyltransferase. *Plant Physiol.* 102:47(248).
- Crafts-Brandner, S.J. and Houtz, R.L. 1993. Protein degradation in chloroplast lysates. *Agron. Abstr.* 110.
- Houtz, R.L., P. Wang, and M. Royer. 1992. Affinity purification of ribulose-1,5-bisphosphate carboxylase/oxygenase large subunit N-methyltransferase. *Plant Physiol.* 99:58(343).
- Houtz, R.L., H. Fang, and M. Royer. 1992. Identification and specificity studies of ribulose-1,5-bisphosphate carboxylase/oxygenase large subunit N-methyltransferase. *Plant Physiol.* 99:58(344).
- Houtz, R.L., M. Royer, and M.E. Salvucci. 1991. Partial purification and characterization of ribulose-1,5-bisphosphate carboxylase/oxygenase large subunit N-methyltransferase. *Plant Physiol.* 96:9.
- Houtz, R.L., D.D. Archbold, and M. Royer. 1990. Atmospheric CO₂ enrichment of tomato and strawberry plants under field production conditions. *HortScience* (in press).
- Houtz, R.L., L. Poneleit, and M. Royer. 1990. N-terminal acetylation and methylation of lys-14 in the N-terminus of the large subunit of rubisco from several plant species. *Plant Physiol.* 93(1):64.
- Knavel, D.E., R. Houtz. 1988. Yield and leaf area of short-internode muskmelon genotypes at different spacings. *HortScience* 23(3):136.
- Houtz, R.L., R.M. Mulligan, J.T. Stults, and N.E. Tolbert. 1988. Structure/function studies of the large subunit of rubisco from spinach and muskmelon by limited tryptic proteolysis. *HortScience* 23(3):154.
- Houtz, R.L., R.M. Mulligan, J.T. Stults, and N.E. Tolbert. 1988. Amino-terminus of the large subunit of rubisco from spinach, wheat, tobacco, and muskmelon leaves. *Plant Physiol.* 86(4):30.
- Lakitan, B., Dean E. Knavel, Robert L. Houtz, Robert L. Geneve, Douglas D. Archbold. 1987. Water influx and calcium content as related to fruit cracking in pepper (*Capsicum annuum* L.). *HortScience* 22(5):1082.
- Houtz, R.L., J.G. Strang. 1987. Yield of fresh-market bell peppers (*Capsicum annuum*) as influenced by cultivar and several cultural practices. *HortScience* 22(5):1100.
- Houtz, R.L., R. Michael Mulligan. 1987. Transition-state analogue binding or catalytic conditions protect the tryptic sensitive sites on the large subunit of rubisco from proteolysis. *Plant Physiol.* 83(4):69.
- Knavel, D.E., R.L. Houtz. 1986. Main dwarf muskmelon. *HortScience* 21(3):705.
- Archbold, D.D., R.L. Houtz. 1986. Strawberry plant growth, photo- synthesis, and ribulose-1,5-bisphosphate carboxylase/oxygenase (rubisco) activity as affected by paclobutrazol and flurprimidol. *HortScience* 21(3):156.
- Houtz, R.L., M. Royer. 1986. Light regulation of ribulose-1,5-bisphosphate carboxylase/oxygenase (rubisco) in muskmelon (*Cucumis melo*) leaves. *HortScience* 21(3):156.
- Houtz, R.L., Ries, S.K. and N.E. Tolbert. 1984. Stimulation of photosynthetic CO₂ fixation by *Chlamydomonas reinhardtii* with triacontanol. *HortScience* 19(3):441.
- Houtz, R.L., Putnam, A.R. and S.K. Ries. 1984. Allelopathic exudates from velvetleaf (*Abutilon theophrasti* Medic.) trichomes. *Weed Science Society of America (Abstracts)* p.58.
- Houtz, R.L. and S.K. Ries. 1981. An *in vitro* system responsive to triacontanol. *HortScience* 16(3):441.
- Ries, S., Wert, V., and R. Houtz. 1981. Rapid *in vivo* and *in vitro* effects of triacontanol. *Proc. 8th Ann. Plant Growth Reg. Soc. of Amer.* 137.
- Ries, S., Wert, V., and R. Houtz. 1981. The rapid response of plants to triacontanol. Presented at the First Coordination Meeting of the Coordinated Research Program on Isotopic Tracer-Aided Studies of the Management, Sept. 28-Oct. 2, 1981, Vienna, Austria.
- Houtz, R.L. 1981. Development and characterization of an *in vitro* system responsive to 1-triacontanol. *Plant Growth Regulator Bulletin* 9(3):5.
- Ries, S., Wert, V., Dilley, D., Houtz, R. and R. Knowles. 1979. Rapid response of plants to triacontanol. *Plant Physiol.* (Supplement) 63:47.

F. Professional and Honor Societies

American Society of Horticultural Science
American Society of Plant Physiologists
American Association for the Advancement of Science
Gamma Sigma Delta
Sigma XI

G. Honors and Awards

National Academy of Inventors, University of Kentucky, 2018.

Thomas Poe Cooper Award for Excellence in Research, College of Agriculture, University of Kentucky, 2001.

Chairman (2006), NC1142, Regulation of Photosynthetic Processes, Multi-State Research Project

VI. RESEARCH ADVISING

A. Post-Doctoral Research Associates

Major Advisor:

Niahr Nayak, Ph.D. Development and Utilization of Rubisco LSMT as a Molecular Vehicle for Targeting Enzymes to Rubisco. From the Department of Agronomy, University of Kentucky. June 1, 2005 – present.

Roberta Magnani, Ph.D. Mapping Polypeptide Substrate Specificity Determinants in Rubisco LSMT. From the Department of Agricultural Sciences, University of Bologna, Italy. April 21, 2005 – present

Mark A. Williams, Ph.D. Molecular Engineering of Rubisco LSMT for increased Rubisco Activity *In Vivo*. From the Department of Developmental and Cell Biology, University of California, Irvine. August, 1999-December 1, 2000.

Lynnette M. Dirk, Ph.D. Molecular and Biochemical Characteristics of the Methylation of the Small Subunit of Rubisco. From the Department of Botany, University of California, Davis. March 1, 1999- Present.

Anandita Das, Ph.D. Molecular and Biochemical Characteristics of the Methylation of the Small Subunit of Rubisco. From the Department of Botany, Bose Institute, Calcutta, India. April 1, 1998-present.

Mitra Mazarei, Ph.D., Functional Analysis of the Promoter Region for the Tobacco Rubisco LSMT Gene. From the Plant Biology Division, The Samuel Roberts Noble Foundation. January 2, 1997-January 2, 1998.

Zhentu Ying, Ph.D., Mechanism and Significance of Post-Translational Modifications in the Large Subunit (LS) of Ribulose Bisphosphate Carboxylase/Oxygenase (Rubisco). From the University of Miami Medical School, Miami, FL. 1994-1996. Currently employed by the University of Florida at the Homestead Experiment Station.

Co-Advisor:

Ross O. Nable, Ph.D., in the Department of Agronomy. Major Advisor: Dr. James E. Leggett, Adjunct Professor, Department of Agronomy. The Effects of Manganese Toxicity on Photosynthetic CO₂ Assimilation in Tobacco. May, 1985 - April, 1986.

B. Graduate

Major Advisor:

Amanda Fergusson, M.S. graduate, Plant and Soil Science Program; Project: Evaluation of high tunnels as a seasonal extending technology for vegetable production in Kentucky. Fall 2004.

Brent Meier, Ph.D. graduate, Department of Horticulture, Plant Physiology/Biochemistry/Molecular Biology Program; Project: "Molecular targeting of human carbonic anhydrase to the active-site vicinity of Rubisco LSMT." Spring 2004.

Qi Zheng, Ph.D. graduate, Department of Horticulture and Landscape Architecture, Plant Physiology/Biochemistry/Molecular Biology Program; Project: "The Mechanism of Specificity for the Interaction between Rubisco Large Subunit \cdot N-Methyltransferase and Rubisco." Summer 1994; Graduated August, 1997. Currently employed by the University of Florida at the Homestead Experiment Station.

Myrna I. Lopez, M.S. graduate and recipient of Lyman T. Johnson doctoral fellowship, Department of Horticulture and Landscape Architecture, Plant & Soil Science Program; Project: "Kinetic Analysis of the Reaction Mechanism for Ribulose-1,5-Bisphosphate Carboxylase/Oxygenase Large Subunit \cdot N-Methyltransferase." Graduated July, 1997.

Jianmin Wang, Ph.D. candidate, Department of Horticulture and Landscape Architecture, Plant Physiology/Biochemistry/Molecular Biology Program; Project: "Effects of Antisense and Sense Expression of Rubisco LSMT in Transgenic Tobacco Plants on the Methylation of Lys-14 in the Large Subunit of Rubisco." Fall 1994 - Fall 1995. Elected to leave program.

Pinger Wang, M.S. graduate, Department of Horticulture and Landscape Architecture, Plant Physiology/Biochemistry/Molecular Biology Program; Project: "Characterization of an Affinity Purification Technique for Rubisco Large Subunit \cdot N-methyltransferase." Graduated Spring 1993.

Hui Fang, M.S. graduate, Department of Horticulture and Landscape Architecture, Plant Physiology/Biochemistry/Molecular Biology Program; Project: "Effects of Lysine-14 methylation in the Large Subunit of Ribulose Bisphosphate Carboxylase/Oxygenase on Catalytic Activity and Stability." Graduated Spring 1993.

Committee Member:

Keith Allen, Ph.D. candidate, Plant Physiology/Biochemistry/Molecular Biology Program. (in progress).

Nitima Suttipanta, Ph.D. candidate, Plant Physiology/Biochemistry/Molecular Biology Program. Graduated 2011.

Tom Niehaus, Ph.D. candidate, Plant Physiology/Biochemistry/Molecular Biology Program. Graduated 2011.

Darby Harris, Ph.D. candidate, Plant Physiology/Biochemistry/Molecular Biology Program. Graduated 2011.

Meshack Afithile, Ph.D. candidate, Plant Physiology/Biochemistry/Molecular Biology Program. Graduated 2000.

Timothy P. Devarenne, Ph.D. candidate, Plant Physiology/Biochemistry/Molecular Biology Program. Graduated 1998.

Cunxi Wang, Ph.D. candidate, Plant Physiology/Biochemistry/Molecular Biology Program. 1995-1998.

Shaohui Yin, Ph.D. candidate, Plant Physiology/Biochemistry/Molecular Biology Program. Graduated 1996.

Qingshun Li, Ph.D. candidate, Plant Physiology/Biochemistry/Molecular Biology Program. Graduated 1995.

Kyoungwhan Back, Ph.D. candidate, Plant Physiology/Biochemistry/Molecular Biology Program. Graduated 1995.

Yan Huang, M.S. graduate, Plant Physiology/Biochemistry/Molecular Biology Program. Graduated 1995.

Xiangha Yan, Ph.D. candidate, Plant Physiology/Biochemistry/Molecular Biology Program. Graduated 1995.

Rui Wang, Ph.D. candidate, Plant Physiology/Biochemistry/Molecular Biology Program. Graduated 1995.

Jeffrey W. Stringer, Ph.D. candidate, Department of Forestry. Graduated 1993.

Guoqiang Hou, Ph.D. candidate, Crop Science Program. 1992.

Robert C. MacDonald, Ph.D. candidate, Department of Forestry. Graduated 1991.

Lorianne Matthews, Ph.D. candidate, Department of Plant Pathology. Graduated 1991.

Herawati Thalib, M.S. candidate, Department of Horticulture and Landscape Architecture. Graduated 1988.

Benyamin H.T. Lakitan, M.S. candidate, Department of Horticulture and Landscape Architecture. Graduated 1987.

C. Undergraduate

Advisor: (research projects supplemented or fully funded by external competitive grant dollars)

Erin Mulligan, graduated Fall 2006, Agricultural Biotechnology major. Research project: Kinetic analyses of the reaction mechanism for SET-domain containing protein methyltransferases.

Janey Moore, Agricultural Biotechnology major. Research Project: Chloroplast-localized N-terminal protein processing by peptide deformylase.

Megan Flynn, Honors student and Agricultural Biotechnology major. Research project: Kinetic analyses of the reaction mechanism for SET-domain containing protein methyltransferases. Graduated Spring 2004.

Heather Conn, graduated Spring 2002, Agricultural Biotechnology major. Research project: Molecular and biochemical characterization of chloroplast-localized peptide deformylase. Recipient of a travel grant from the American Society of Plant Biology to attend the 2002 meetings. Current Position: Senior Research Analyst, Department of Horticulture, Supervisor – Dr. Mark Williams.

Brian Zamora, graduated *summa cum laude* Spring 2002, Honors student and Agricultural Biotechnology major. Research project: Molecular engineering of resistance to peptide deformylase inhibitors in *Arabidopsis thaliana*. University of Kentucky Undergraduate Research and Creativity Grant, \$502., Spring 2002. Current Position: M.D./Ph.D. program at West Virginia University.

Augustine Torres, undergraduate in Agricultural Biotechnology. Senior Research Project. Summer 1998.

Laura Durbin, undergraduate in Agricultural Biotechnology. Senior Research Project. University of Kentucky Honors Program Student. Recipient: Howard Hughes Medical Institute Undergraduate Initiative Grant for Research, funded Jan 30, 1996, \$850. Fall 1995-Spring 1997.

Myrna I. Lopez, recipient of United States Department of Education Summer Fellowship to Encourage Minority Participation in Graduate Education. Summer 1994.

Undergraduate French Interns (3), Undergraduate Fellowship Program through Agricultural International Programs, University of Kentucky:

- Maryse Cattaneo, Summer 1993
- Celine Hanot, Summer 1994
- Guillaume Portejoie, Summer 1996

Loelle Poneleit, undergraduate in the Department of Horticulture and Landscape Architecture. Independent Research Project. 1989-1990.

Samantha B. Jones, recipient of United States Department of Education Summer Fellowship to Encourage Minority Participation in Graduate Education. Summer 1989.

Co-Advisor:

Mark Williams, undergraduate in the Department of Biology, independent research project with Dr. William Cohen. 1989-1990.

Academic Advisor:

Advise all Agriculture Biotechnology students fulfilling ABT 395 requirement.

1999-2004

Advise an average of 5-10 Agriculture Biotechnology students each semester 1999-present.

D. Other

External Examiner - Eun Jeong Lim, Department of Biochemistry, September 2006

Research Mentor - Ms. E. Megan Flynn, recipient of a Beckman Scholarship, 2003.

Research Mentor - Melanie A. Stamper, Chemistry Instructor, Jessamine County High School. Recipient: Howard Hughes Medical Institute Summer Internship for Selected High School Instructors in Chemistry and Biological Science. Summer 1997.

Research Mentor - Melanie A. Stamper, Chemistry Instructor, Jessamine County High School. Recipient: Howard Hughes Medical Institute Summer Internship for Selected High School Instructors in Chemistry and Biological Science. Summer 1996.

High School Student Advisor: John Hafner, recipient of the 1995 Golden Scholarship (\$7,000) award from the Multiple Sclerosis Association of America. I provided the guidance and laboratory for scientific research experience for John since 1990. John's accomplishments were featured in both the *Lexington Herald-Leader* and *Paris Sun* newspapers, where his internship at the University of Kentucky was featured as notable scholastic achievement.

Contact and placement person for Lafayette High School Experience Based Career Education Program. Coordinator: Lynn Akers. 1995-present.

University coordinator and contact individual for the implementation of the site-licensed Research Information System (RIS) Reference Update (RU) reference retrieval system. Implementation of the

site-licensed software resulted in a minimum savings of \$6000 to those research personnel at the University of Kentucky with active subscriptions to the RIS-RU database.

VII. RESIDENT INSTRUCTION (Teaching Portfolio available on request)

- BCH/PPA/PLS 609, 3 credit hours, Plant Biochemistry (formerly BCH/PPA/PLS 503 with additional information). An in-depth examination of the biochemical mechanisms and enzymology associated with photosynthesis. 12 hours lecture. Spring 2003 - present.
- ABT 395, 1-4 credit hours, Independent Study in Biotechnology. Independent study under the supervision of a faculty member. Coordinator, Fall/Spring/Summer 1999-2004.
- ABT 399, 1-6 credit hours, Experiential Learning in Biotechnology. An internship in biotechnology under the supervision of a faculty member. Fall/Spring/Summer 1999-2004.
- ABT 201, 1 credit hour, Scientific Method and Logic in Agricultural Biotechnology. A required course for Agriculture Biotechnology majors designed to acquaint students with common experimental methods used in biotechnology, the interpretation of scientific data, and its effective communication via written and oral reports. Fall 1994-2008.
- BIO/PLS/HOR/AGR/FOR 623, 3 credit hours, Physiology of Plants II. Detailed examination of the biochemical pathways involved in chaperonin-mediated protein folding and targeted protein degradation. 7 hours lecture. 1997-2001.
- BCH/PPA/PLS 503, 3 credit hours, Plant Biochemistry. An in-depth examination of the biochemical mechanisms and enzymology associated with photosynthesis. 12 hours lecture. 1986-2002.
- HOR 375/410, 3 credit hours, Growth and Development of Horticultural Crops. A biochemical and physiological examination of the relationships between photosynthetic carbon assimilation, electron transport, water relations, and temperature stress tolerance as determinants in horticultural crop productivity. 11 hours lecture. Fall 1987-Spring 1995.
- AGR 630, 3 credit hours, Experimental Techniques in Plant Physiology/Biochemistry. Principles of radioactivity and application of radioactive isotopes in biological research. 16 hours lecture and laboratory. Summer 1986, 1988, 1990.
- BIO 106, 3 credit hours, Plant Biology. Thermodynamics, respiration, and photosynthesis. 15 hours lecture. Fall 1992.
- HOR 601, 2 credit hours, Physiological Mechanisms in Horticultural Plants. Survey course of research in horticulture. 3 hours lecture. Fall 1994.
- BIO 773, 1 credit hour, Plant Physiology/Biochemistry Seminar Series. Fall 1986 - Spring 1987.
- Teaching Assistant, Michigan State University, Department of Horticulture, Horticulture 801, Research Procedures in Plant Science, Winter 1978, 1979.
- Teaching Assistant, Michigan State University, Department of Horticulture, Horticulture 457, Cool Season Vegetable Crops, Fall 1979.

VIII. COMMITTEE ASSIGNMENTS

A. Departmental

- Chair, Safety Committee, 1999-2001
- Internal Review Committee, 1993-present
- Graduate Studies Committee, 1990-present
- Project Review Committee, 1989-present
- Chair, Search and Screening Committee, Molecular Biology Position, 1995-1998
- Advisory Committee to Chair, 1994-1995
- Chair, Research Committee, 1991-1995
- Search and Screening Committee for Department Chair, 1989-1990
- Chair, Search and Screening Committee for Molecular Biology Position, 1991-1992
- Search and Screening Committee for Stress Physiology Position, 1991-1992
- Co-Director, Seminar Series, Dept of Horticulture & Landscape Architecture, 1992

B. Interdepartmental Organizations

- Executive Committee, Plant Physiology/Biochemistry/Molecular Biology Program, 1992-1995
- Member, Plant Physiology/Biochemistry/Molecular Biology Program - 1985-present
- Search & Screening Committee, Biochemistry Position, Department of Agronomy, 1997-1999
- Co-Chair, Plant Physiology/Biochemistry/Molecular Biology Program Seminar Committee, Fall 1986, Spring 1987

C. College

Review Committee, KTRDC, 2006
Member, Advisory Committee for Beckman Undergraduate Research Scholars Program
Chair, Advisory Committee for Appointment, Promotion and Tenure, 2004-2005
Appointed by the Dean to the College Strategic Planning Committee, 2003.
Advisory Committee for Appointment, Promotion and Tenure, 2002-2005
Member, Search Committee, Molecular Genetics position in Agronomy, 2002
Academic Scholarship Review Committee, Fall 2002
Chair, Agricultural Biotechnology Coordinating Committee, 1999-2004
Member, Agricultural Biotechnology Coordinating Committee, 1990-1995; 2013-present
Agriculture Plant Sciences Committee, 1997-1998
Agriculture Faculty Council (elected position), 1995-1997
Faculty Appeals Committee, 1993, 1997
College of Agriculture Library System Committee, 1991-1994
Agricultural Experiment Station Project Committee, 1994-1997
Gamma Sigma Delta, Outstanding Graduate Student Award Committee, Chair, 1996-1997
Gamma Sigma Delta, Outstanding Graduate Student Award Committee, 1995-1996

D. University

Program Review Panel, UK Intellectual Property, 2006
Fellowship Review Panel, UK Woman's Club Fellowship, 2006
Fellowship Review Panel, Presidential Fellowships, 2006
Elected Member, University Senate, 2004-2007, 2007-2009.
Review Panel, Council of Southern Graduate Schools' Thesis Competition, December, 2005
Major Research Equipment Review Committee, 2002
Presidential Task Force on Computer Security and Resource Allocation Committee, 2002
Beckman Undergraduate Scholars Program Advisory Committee, 2001-present
Chair, Plant Science Technical Advisory Committee, Tobacco and Health Research Institute, 1998, 1999
Member, Research Committee Grants Review Panel, 1999
Howard Hughes Medical Institute, Undergraduate Research Committee, 1992-1994; 1997
Chair, University Faculty Senate Research Committee, 1996-1997
Technical Advisory Committee, Tobacco and Health Research Institute, 1993-1995
Research Committee Grants Review Panel, 1992

IX. PUBLIC SERVICE

Invited Speaker, Fayette County Master Gardener Association, "Genetically Modified Crops and You." February 24, 2001.
Science Demonstration Project - 5th Grade science classes (4 sessions), Strode Station Elementary School, Winchester, KY. "Electron Transport and Photosynthesis, Chemiluminescence." September 2000.
Invited Speaker, Fayette County Master Gardener Association. "The Future of Biotechnology." January 23, 2000.
Invited Speaker, Extension Agents Training, Horticultural Concepts. "Transgenic Plants." March 23, 1999.
"Biotechnology in Horticulture," presented at the 1988 133rd annual meeting of the Kentucky State Horticultural Society.
"Global atmospheric CO₂, problem or benefit?," presented to the Daughters of the American Revolution, Lexington Chapter, October 14, 1988.
Effects of Trickle Irrigation on Bell Pepper Yields, 1987. Investigators: Robert L. Houtz and John G. Strang. "Trickle Irrigation Installation for Horticultural Crops," presented a short course at the University of Kentucky research farm (South Farm) on March 24, 1987.
Evaluation of Foliar Nitrogen and Cytokinin on Bell Peppers. Investigators: Robert L. Houtz and John G. Strang. Presented at the 132nd Annual Meeting of the Kentucky State Horticultural Society, 1987.

Two Year's Results on the Effects of Trickle Irrigation, Black Plastic Mulch, Raised Beds, and Plant Density on Two Varieties of Bell Peppers. Investigators: Robert L. Houtz and John G. Strang. Presented at the 131st Annual Meeting of the Kentucky State Horticultural Society, 1986.

Reduced Tillage Sweetcorn. Investigators: Dean E. Knavel and Robert Houtz. Horticulture Field Day, South Farm, Lexington, 1985

Strang, J. G., R. L. Houtz. Effects of trickle irrigation, black plastic mulch, raised beds, and plant density on two varieties of bell peppers. 130th annual winter meeting of the Kentucky Horticultural Society, December 9-10, 1985.

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