**CURRICULUM VITAE**


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**Birthdate**: June 16, 1950
**Hometown:** Clearwater, Florida
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**Degrees**:
B. Sc., Biological Sciences, Purdue University, 1968-1972
Ph. D., Plant Physiology, Colorado State University, 1973-1977
Dissertation: The mechanism of phytochrome-mediated lettuce seed germination.

**Academic Appointments:**

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| 2010-present | Chair, Energy Biosciences Research Community, Purdue University |
| 1989-present | Professor, Department of Botany and Plant Pathology, Purdue University |
| 1998 | Guest Professor, Instituto de Botânica, São Paulo, SP, Brasil |
| 1994 | Guest Professor, Institut für Pflanzenbiologie, Universität Zürich, Zürich, Switzerland |
| 1983-1989 | Associate Professor, Department of Botany and Plant Pathology, Purdue University, West Lafayette, Indiana |
| 1986-1987 | Visiting Professor, Institut für Pflanzenbiologie, Universität Zürich, Zürich, Switzerland |
| 1979-1983 | Assistant Professor, Department of Botany and Plant Pathology, Purdue University, West Lafayette, Indiana |
| 1977-1979 | Post-doctoral Fellow, MSU-DOE Plant Research Laboratory, Michigan State University, East Lansing, Michigan |

**Memberships**:
American Association for the Advancement of Science
American Society of Plant Biologists
American Chemical Society

**Appointments, Awards, and Honors**:
Agricultural Research Award, Purdue University, 1991; Purdue Seeds for Success Award, 2005, 2009, 2010; College of Agriculture Millionaire's Club 2009, 2010

Elected Member of the Executive Committee of the American Society for Plant Biologists, (2002-2005); Elected Secretary and Chair of the Program Committee of the American Society of Plant Biologists (2005-2007); Member of Program Committee of the American Society of Plant Biologists (2005-2009); President-elect, President, and Immediate Past President (2009-2012)

Elected Fellow of the American Society of Plant Biologists, 2009

Elected Vice-chair, Gordon Conferences on "Plant Cell Walls 2003", and designated Chair for "Plant Cell Walls 2006"; Member of the International Advisory Board for the Plant Cell Wall

Meetings (2003-2004); Co-chair (with S. Long, Univ. Illinois) and organizer, 1st Pan-American Congress on Plants and Bioenergy; Member, International Committee, 2nd Pan-American Congress on Plants and Bioenergy

Editorial Board, *Methods in Cell Science* (1994-2003); Monitoring Editor, *Plant Physiology* (1998-2001); Editorial Board, *Planta* (1996-2000); Editorial Board, *Plant Physiology* (1987-1992)

Panel Member, DOE Young Investigator Program, 2009; Panel Member, U.S.D.A./N.R.I.C.G.P. Plant Biology: Biochemistry, 2006; Panel Member, U.S.D.A./N.R.I.C.G.P. Plant Genome, 2004; Panel Head, B.A.R.D. Cell and Molecular Biology, 1996-1998; Panel Member, B.A.R.D. Cell and Molecular Biology, 1993-1994; Panel Member, U.S.D.A./N.R.I.C.G.P. Plant Growth and Development, 1991-1993; Panel Member, Basic Energy Sciences Grants Program, Department of Energy, 1988
Coordinator of "CytoNet", a cytoskeleton-cell wall continuum research group (1992-1998)
Elected member of Sigma Xi, Gamma Sigma Delta

**Teaching Experience:**

I have maintained a strong involvement in both undergraduate and graduate education. Technological advances in communications present today's undergrads today with an enormous spectrum of information inputs. Much is said about the next generation student requiring more high-speed delivery and gaming strategies to encourage and promote learning. However, I still regard human-human interaction be to be the most important. I regard the professor in the classroom as the most durable method to develop sound scientific concepts and principles in students. Students often learn more from fellow students than from the prof. That said, today's educators need to take advantage of the advancing technologies to match the young students enhanced capacity for perception.

While the delivery of basic principles in novel forms may have some distinct advantages in some contexts, particularly for the non-major, it is perceived by many to have disadvantages for the developing scientist who shouldn't be saddled by too descriptive versions of principles that mask the unknowns. For young scientists, I feel the best way to learn science is in the laboratory – professors at major research universities do their best teaching in the lab. My programs have always involved undergraduate and high school students in the science. Many have made such salient contributions to result in authorship (even first authorship) of scientific publications. [I have placed an asterisk on the names of undergrads among the publications list.]

A strong example of our most recent impact on undergraduate education is in the Research Experience for Undergraduate (REU) students program for which we received supplemental funding from the National Science Program. In addition to the 13 post-doctoral and 7 graduate students funded in our program, we involved 76 undergraduates, 9 exchange students, 1 high school teacher and 2 high-school students directly in the daily running of the project in our respective labs (four institutions). From combination of funds from other projects, almost 50 undergrads have worked in my lab since 2002. Individual student projects involved experience in plant genetics, biochemistry, molecular biology, bioinformatics, cell biology and spectroscopic techniques, workshops and visits to other institutions. At the conclusion of each program, students assembled at a host institution (2003–Purdue, 2004–Florida, 2005–Wisconsin) for a one-day symposium where each student presented a 20 min lecture on the results of their research. In 2004, all of the REU students attended the annual meeting of the American Society of Plant Biologists (also in Florida) and presented posters at the Undergraduate Poster Session. Without question, these programs have been formative experiences for the undergraduates, and many of them remained in our respective programs and continued work towards Honor's Thesis projects. Over 70% of undergraduates from our REU programs and lab internships have gone on to graduate school, 8 in plant biology.

- BTNY 101 Plant Science Seminar. Fundamentals of plant biology
- BTNY 201 Plants and Civilization. Non-majors course on the origins and history of plants and agriculture (current)
- BTNY 420 Plant Cell and Developmental Biology. An advanced undergraduate level course on cellular, biochemical and molecular aspects of plant development
- BTNY 553 Plant Growth and Development. A graduate level core course in the Plant Biology and Plant Genetics Programs
- BTNY 595 Plant Research Methods. Research modules on the theoretical bases and practical applications of modern research methods. I. GC-MS of Small Molecules, II. Plant Organelle Isolation (current)
- BTNY/BIOL 640 Metabolic Plant Physiology. Advanced graduate level course in plant biochemistry and metabolism--carbohydrate and polysaccharide chemistry and biochemistry (current)

**Special Courses and Programs:**

- "The Biology and Biochemistry of the Plant Cell Wall", Special Course, Instituto de Botânica, São Paulo, Brasil, Spring 1998. A four-week lecture series and a week-long laboratory practical course on carbohydrate chemistry and the biochemistry, cell biology, and molecular biology of the plant cell wall.
- "Cellular Aspects of Plant Growth and Development", Sonderkurs, Institut für Pflanzenbiologie, Universität Zürich, Summer 1994. A nine-week lecture series on physiology, biochemistry, molecular and cellular biology of plant cell development.
- Coordinator, Plant Fiber Biotechnology Doctoral Program, a U.S.D.A National Needs program involving six other scientists, 1995-2000. A doctoral curriculum was developed that spans current advances in carbohydrate and lignin chemistry with genetic and molecular biological approaches to engineer plants with altered cell wall properties
- Coordinator, an NSF Genome Research Initiative to identify novel cell-wall genes in Arabidopsis and maize, 2000-2002. A research and training program involves coordination of eight additional scientists in the U.S. and the U.K.
- Principal Investigator, NSF Plant Genome Research Program to identify and characterize cell wall mutants in Arabidopsis and maize using novel spectroscopies, 2002-2006. Project involved 9 Co-PIs at five institutions.
- Principal Investigator, NSF Research Experience for Undergraduates (REU) Program, a supplement to our Plant Genome Research Program, 2003-2006. Project involves 6 Co-PIs at four institutions. We developed summer research internships and workshops that have created opportunities for over 70 undergraduate students during the course of the project.

**Research Summary:**

A plant's development is manifest in the patterns of coordinated division, expansion, and differentiation of its individual cells. Changes in cell shape result largely from physical and biochemical changes in the structure of the cell wall--a firm but dynamic envelope of structural polysaccharides, proteins, and aromatic substances. The principal goals of my research are to understand the diversity of plant cell wall and extracellular polysaccharide structures, to create a complete inventory of the genes responsible for the biogenesis of the wall, to determine the function of cell wall-active gene products, to understand the protein machinery involved in the biochemical synthesis of cellulose and other cell wall backbone polysaccharides, and to understand how cell wall biogenesis is regulated. I anticipate that several of the genes we identify and characterize, as well as several of the plants with genetically defined alterations, will be of economic importance. Examples include the modification of pectin-cross-linking or cell-cell adhesion to increase shelf life of fruits and vegetables, the enhancement of dietary fiber contents of cereals, the improvement of yield and quality of fibers, and improvements in wall mass and composition to improve feedstocks for use as biofuels.

I developed a broad-based program to study wall architecture, the fine structure and biosynthesis of cell-wall polysaccharides, dynamics of the wall during growth, adaptation of wall structure in response to stress, the plasma membrane-wall interface, and genetic approaches to understanding the differential expression of genes related to cell wall metabolism. With several collaborators from US and international institutions, we initiated a 10-year program to identify and characterize all genes that affect cell-wall carbohydrate metabolism. We have annotated almost 1500 genes that function in wall biogenesis in Arabidopsis, and were the first to establish and characterize the wall biogenesis genes of maize, a model C4 grass. We use discriminant analysis programs of Fourier transform infrared (FTIR) spectra as a specific, high throughput method to identify mutations that affect plant cell wall components and architecture. This FTIR "forward" screen will detect specific alterations in wall structure and architecture through mutation. Mutations we should be able to identify could include those causing defects in wall substrate formation, wall component secretion and targeting, wall architecture and dynamics during growth. Genes disrupted in these mutants may subsequently be identified based on the insertion position of the tags or by positional cloning. A complimentary "reverse" genetics approach will examine mutations in genes of both Arabidopsis and maize that are already known to be related to cell wall biosynthesis. Mutants with altered FTIR 'spectrotypes' are being classified by artificial neural networks to provide a robust database for characterization of additional mutants in unknown wall-relevant genes arising from both forward- and reverse-genetic screens. As FTIR mutations are confirmed and characterized, the plant biology community is informed of them through a web site and seeds and clones will be provided to the community through established stock centers (see http://cellwall.genomics.purdue.edu).

My early work developed analytical tools to determine the fine structure of cell wall polysaccharides and their changes during development. This work led to new insights of basic physics of porosity, charge density, and tensile strength, as well as polymer fine structure (linkage structure) and subtle dynamics during wall biogenesis. For example, we established how adaptation to osmotic stress results in wall alterations to accommodate higher turgor, the dynamics and role of (1→3),(1→4)-β-D-glucan architecture of expanding cells of maize, the critical linkages in pectins that result in loss of wall integrity in softening of apples, and the discovery of a new polysaccharide in flax mucilage with unique health benefits. We established that different species of flowering plants synthesize two distinctly different kinds of wall—a Type I wall made by most dicots and about one-half of monocots, and a Type II wall made by grasses and closely related monocots. Molecular models of these two types of cell walls published in 1993 are used widely in textbooks, and the article in which they are presented is recognized by ISI as the most highly cited paper in Plant and Animal Sciences. I also developed the biochemical tools to study the particularly dynamic walls of grasses and cereal, establishing the key biochemical events of wall synthesis in the transition of embryonic cells to elongating cells to differentiating cells.

Parallel to studies of structure have been studies of the biochemical synthesis *in vitro* of the maize (1→3),(1→4)-β-D-glucan at the Golgi apparatus and cellulose synthase at the plasma membrane. We were the first lab to demonstrate the synthesis of a cell wall glycan *in vitro* with a structure exactly as found in the grass wall. We established that the synthesis of β-glucan is the topologic equivalent of cellulose synthase, and provided evidence of an accessory glycosyl transferase that explains its unique mixed-linkage structure. We are now employing proteomic approaches to identify the many associated proteins that are expected to comprise a functional synthase complex. We are also employing a prokaryotic protein expression system to generate sufficient quantities of recombinant cellulose synthase catalytic domains to determine the 3-dimentional structure of its active site. Our studies with recombinant polypeptides comprising the catalytic domain showed for the first time the dimerization of catalytic domains. A recent publication describes the 'catalytic dimer' hypothesis we are now testing. This hypothesis addresses three important problems with the original single polypeptide-single glucan chain hypothesis that has persisted since the discovery of the first CesA gene in 1996

Together with collaborators from Purdue, we are defining the control points for positive and negative regulation of cell wall synthesis. In particular, we discovered that naturally occurring antisense transcripts of a CesA are produced to down-regulate entire suites of the synthases of primary wall, and we are exploring ways to interfere with this regulation to enhance cellulose synthesis in plants—a potential way to enhance biomass feedstock density for agronomic productions of liquid biofuel feedstocks. In still other projects, we investigate proteins that the plasma membrane-cell wall interface that function in a tight adhesion that is induced by osmotic stress. For example, we discovered a novel receptor-like kinase that binds a carbohydrate-binding domain of Fn, not the cell-binding domain, and it contains a protein-kinase domain nears its N-terminus. Its gene is constitutively expressed, and the protein binds tightly to the cell wall. Upon osmotic stress, a proteolytic cleavage frees the fibronectin-binding domain. We suspect that this protein may function as an osmotic stress sensor and signal molecule. As part of this work, we are currently characterizing and developing novel chemically inducible promoters in plants.

**Bioenergy Research at Purdue:**

For several years I have been working with several colleagues to assemble and develop cross-disciplinary teams to engage in transformational research in bioenergy. This effort finally resulted in successful bids for a DOE Feedstock Genomics program to identify and chart expression of cell wall related genes of maize involved in secondary wall formation, a DOE Energy Frontiers Research Center called "Center for the direct Catalytic Conversion of Biomass to Biofuels (C3Bio)", and an NSF Emerging Frontiers in Research and Innovation "EFRI-HyBi: Maximizing Conversion of Biomass Carbon to Liquid Fuel" center grants. I also lead a Washington Project entitled "Midwest Center for Bioenergy Grasses", which evaluates tropical maize and sweet sorghum as low-input sources of sugar and biomass. I led an effort to establish a strong link between basic research and engineering in bioenergy with the implementation of the research into the agricultural landscape in the "Energy Biosciences Research Community (EBRC)". The EBRC comprises about sixty faculty from Agriculture, Engineering, Science, and Technology.

**Publications**:

147. Carpita, N.C. (2011) Update on mechanisms of plant cell wall biosynthesis: How plants make cellulose and other (1→4)-β-D-glycans. *Plant Physiol*. **155**, 171-184.
146. White, W.G., Moose, S.P., Weil, C.F., McCann, M.C., Carpita, N.C., Below, F.E. (2011) Tropical maize – Exploiting maize genetic diversity to develop a novel annual crop for lignocellulosic biomass and sugar production. In *Routes to Cellulosic Ethanol* (M.S. Buckeridge, G. H. Goldman, eds.), Springer, pp. 167-180.
145. Oliveira, C.J.F., Cavalari, A.A., Carpita, N.C., Buckeridge, M.S., Braga, M.R. (2010 Cell wall polysaccharides from cell suspension cultures of the Atlantic Forest tree Rudgea jasminoides (Rubiaceae). *Trees – Struct. Funct*. **24**, 713-722.
144. Carpita, N.C., McCann, M.C. (2010) The maize mixed-linkage (1→3),(1→4)-β-D-glucan polysaccharide is synthesized at the Golgi membrane. *Plant Physiol*. **153**, 1362-1371
143. Joshi, C.P., Thammannagowda, S., Fujino, T., Gou, J-Q., Avci, U., Haigler, C.H., McDonnell, L.M., Mansfield, S.D., Menghesa, B., Carpita, N.C., Harris, D., DeBolt,

S., Peter, G.F. (2011) Perturbation of wood cellulose synthesis causes pleiotropic effects in transgenic aspen. *Molec. Plant*. 4, 331-345.

142. Schnable, P.S., et al. [158 authors] (2009) The B73 maize genome: complexity, diversity and dynamics. *Science* **326**, 1112-1115

141. Penning, B., Hunter, C.T., Tayengwa, R., Eveland, E., *Dugard, C., Olek, A. Vermerris, W., Koch, K.E., McCarty, D.R., Davis, M., Thomas, S.R., McCann, M.C., Carpita, N.C. (2009) Genetic resources for maize cell wall biology. *Plant Physiol.* **151,** 1703-1728

140. Daras, G., S. Rigas, B. Penning, D. Milioni, M.C. McCann, N. C. Carpita, Fasseas, C., P. Hatzopoulos (2009) *thanatos* mutation in *Arabidopsis cellulose synthase 3* (*AtCesA3*) has a semidominant-negative phenotype for cellulose synthesis and plant growth. *New Phytol.* **184**, 114-126.

139. Arsovski, A.A., T.M. Popma, G.W. Haughn, N.C. Carpita, M.C. McCann, T. L. Western (2009) *AtBXL1* encodes a bifunctional β-D-xylosidase/α-L-arabinofuranosidase required for pectic arabinan modification in Arabidopsis mucilage secretory cells. *Plant Physiol.* **150**, 1219-1234.

138. A.H. Paterson, J.E. Bowers, R. Bruggmann, I. Dubchak, J. Grimwood, H. Gundlach, G. Haberer, U. Hellsten, T. Mitros, A. Poliakov, J. Schmutz, M. Spannagl, H. Tang, X. Wang, T. Wicker, A.K. Bharti, J. Chapman, F.A. Feltus, U. Gowik, I.V. Grigoriev, E. Lyons, C.A. Maher, M. Martis, A. Narechania, R.P. Otillar, B.W. Penning, A.A. Salamov, Y. Wang, L. Zhang, N.C. Carpita, M. Freeling, A.R. Gingle, C.T. Hash, B. Keller, P. Klein, S. Kresovich, M.C. McCann, R. Ming, D.G. Peterson, Mehboob-ur-Rahman, D. Ware, P. Westhoff, Kl.F.X. Mayer, J.Messing, D.S. Rokhsar (2009) The *Sorghum bicolor* genome and the diversification of grasses. *Nature* **457**, 551-556

137. Tobias, C. M., G. Sarath, P. Twigg, E. Lindquist, J. Pangilinan, B. W. Penning, K. Barry, M. C. McCann, N. C. Carpita, G. R. Lazo (2008) Comparative genomics in switchgrass using 68,585 high-quality EST. *Plant Genome* **1**, 111-124

136. Held, M., Penning, B., Brandt, A.S., *Kessans, S.A., Yong, W., Scofield, S.R., Carpita, N.C. (2008) Naturally occurring antisense transcripts of a cellulose synthase gene in barley initiates negative control of cell wall biosynthesis involving small interfering RNAs. *Proc. Natl. Acad. Sci, USA* **105**, 20534-20539

135. Naran, R., Chen, G., Carpita, N.C. (2008) Novel rhamnogalacturonan I and arabinoxylan polysaccharides of flax seed mucilage. *Plant Physiol*. **148**, 132-141

134. Carpita, N.C., McCann, M.C. (2008) Maize and sorghum: genetic resources for bioenergy grasses. *Trends Plant Sci*. **13**, 415-420

133. McCann, M.C., Carpita, N.C. 2008. Designing the deconstruction of plant cell walls. *Curr. Opin. Plant Biol*. **11**, 314-320

132. Carpita, N. (2007) Cell wall-ion interactions – Significance for the nutrition of plants and their stress tolerance. In Apoplast of Higher Plants: The significance of the apoplast for the mineral nutrition of higher plants, Sttelmacher, B., Horst WJ, eds., pp. 15-18. Springer, Dordercht, The Netherlands

131. Dean, G. H., Zheng, H., Tewari, J., Huang, J., Young, D.S., Hwang, Y.T., Western, T.L., Carpita, N.C., McCann, M.C., Mansfield, S.D., Haughn, G.W. 2007. The Arabidopsis *MUM2* gene encodes a β-galactosidase required for the production of seed coat mucilage with correct hydration properties. *Plant Cell* **19**, 4007-4021

130. Vermerris, W., Saballos, A., Ejeta, G., Mosier, N.S., Ladisch, M.R., Carpita, N.C. 2007. Molecular breeding to enhance ethanol production from corn and sorghum stover. *Crop Sci*. **47**, S142-S153

129. Sindhu, A., Langewisch, T., Olek, A., Multani, D.S., McCann, M.C., Vermerris, W., Carpita, N.C., Johal, G. 2007. Maize *Brittle stalk2* encodes a COBRA-like protein expressed in early organ development but required for tissue flexibility at maturity. *Plant Physiol*. **145**, 1444-1459

128. McCann, M.C., M. Defernez, B.R. *Urbanowicz, J.C. Tewari, T. Langewisch, A. Olek, B. Wells, R. H. Wilson, and N.C. Carpita. 2007. Neural network analyses of infrared spectra for classifying cell wall architectures. *Plant Physiol.* **143**, 1314-1326.

127. Karthikeyan, A.S., Varadarajan, D.K., Jain, A., Held, M.A., Carpita, N.C., Raghothama, K.G. (2007) Phosphate starvation responses are mediated by sugar signaling in Arabidopsis. *Planta* **225**, 907-918.

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125. Perez-Almeida, I., Carpita, N.C. (2006) β-Galactosidases and cell wall dynamics. *Interciencia* **31**, 476-483

124. Braga, M.R., Carpita, N.C., Dietrich, S.M.C., Figueiredo-Ribeiro, R.C.L. 2006. Changes in pectins of the xylopodium of *Ocimum nudicaule* from dormancy to sprouting. *Braz. J. Plant Physiol.* **18**, 325-331

123. Tiné, M.A.S., C.O. Clovis, D.U. de Lima, N.C. Carpita, M.S. Buckeridge. 2006. Fine structure of a mixed-oligomer storage xyloglucan from seeds of *Hymenaea courbaril*. *Carbohydr. Polym.* **66**, 444-454.

122. Carpita, N. 2005. Starting a Life in Science with Debby Delmer: Exploring the synthesis of cellulose and other (1→4)-β-linked glucans. In: Hayashi, T., ed., Frontiers in Plant Cell Walls, Elsevier, Dordrecht, pp. 78-86.

121. McCann, M. C., N. C. Carpita. 2005. Screening for cell-wall phenotypes by infrared spectroscopy. In: Hayashi, T., ed., Frontiers in Plant Cell Walls, Elsevier, Dordrecht, pp. 63-70.

120. McCann, M. C., N. C. Carpita. 2005. Looking for invisible phenotypes in cell-wall mutants of *Arabidopsis thaliana. Plant Biosystems* **139**, 80-83.

119. Yong, W., B. Link, R. O'Malley, J. Tewari, C. T. *Hunter III, C-A. Lu, X. Li, A. B. Bleecker, K. E. Koch, M. C. McCann, D. R. McCarty, S. E. Patterson, W-D. Reiter, C. Staiger, S. R. Thomas, W. Vermerris, N. C. Carpita. 2005. Genomics of plant cell wall biogenesis. *Planta* **221**, 747-751 (invited review)

118. Sugimoto-Shirasu, K., Carpita, N.C. and McCann, M.C. (2004) The cell wall: a sensory panel for signal transduction. In: The Plant Cytoskeleton in Cell Differentiation and Development. (P. Hussey, Ed.), Blackwell Publishers, UK, 344 pp.

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116. *Urbanowicz, B. R., C. Rayon, N. C. Carpita. 2004. Topology of the maize mixed-linkage (1→3),(1→4)-β-D-glucan synthase at the Golgi membrane. *Plant Physiol.* **134**, 758–768.

115. Lao, N. T., D. Long, S. Kiang, G. Coupland, D. A. *Shoue, N. C. Carpita, T. A. Kavanagh. 2004. Mutation of a family 8 glycosyltransferase gene alters cell wall carbohydrate composition and causes a humidity-sensitive semi-sterile dwarf phenotype in Arabidopsis. *Plant Mol. Biol.* **53**, 647-663.

114. Peña, M. J., P. Ryden, M. Madson, A. Smith, W-D. Reiter, N. C. Carpita. 2004. Galactosylation of xyloglucans is essential for maintenance of cell wall tensile strength during cell growth in plants. *Plant Physiol.* **134**, 443–451.

113. Buckeridge, M. S., C. Rayon, B. *Urbanowicz, M. A. S. Tine, N. C. Carpita. 2004. Mixed linkage (1→3),(1→4)-β-D-glucans of grasses. *Cereal Chem.* **81**, 115-127.

112. Zhu, Y., J. Nam, N. C. Carpita, A. G. Matthysse, and S. B. Gelvin. 2003. Agrobacterium-mediated root transformation is inhibited by mutation of an Arabidopsis cellulose synthase-like gene. *Plant Physiol.* **133**, 1000-1010.

111. Madson, M., C. Dunand, R. Verma, G. F. Vanzin, J. Caplan, X. Li, D. A. *Shoue, N. C. Carpita, W-D. Reiter. 2003. Xyloglucan galactosyltransferase, a plant enzyme in cell wall biogenesis homologous to animal exostosins. *Plant Cell* **15**, 1662–1670.

110. Vanzin, G. F., M. Madson, N. C. Carpita, N. V. Raikhel, K. Keegstra, W-D. Reiter. 2002. The *mur2* mutant of *Arabidopsis thaliana* lacks fucosylated xyloglucan because of a lesion in fucosyltransferase AtFUT1. *Proc. Natl. Acad. Sci. USA* **99**, 3340-3345.

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Current programs:

Translational genomics for the improvement of switchgrass. [PI: N. Carpita, co-PI: M. McCann], USDA-DOE Plant Feedstock Genomics for Bioenergy, 3 years, $1,200,000 [09/15/08-09/14/11]

Center for Direct Catalytic Conversion of Biomass to Biofuels (C3Bio) [PI: M. McCann, and six Co-PIs], DOE-Energy Frontier Research Center, 5 years, $20,000,000 [09/01/09-08/31/14]

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**Abstracts:**

I have authored or co-authored over 150 published abstracts for presentations at national and international meetings, and most have resulted in publication of full manuscripts in refereed journals.

**Publication Honors:**

Named among the ISI Highly Cited authors in Plant and Animal Biology. As calculated by ISI: Numbers of times cited: 6,640; Average citations per item: 45.1; h-index: 41

The article "Carpita, N. C., and D. M. Gibeaut. 1993. Structural models of primary cell walls in flowering plants: Consistency of molecular structure with the physical properties of the walls during growth. *Plant J.* **3,** 1-30" is now the highest cited paper ever [now with over 1500 citations] in the area of Plant and Animal Biology (as computed by ISI). See January 2003 interview: http://www.in-cites.com/papers/NicholasCarpita.html]

**Patents:**

T. K. Hodges, Antunes, M. S., N. C. Carpita, 2010. Benzoate inducible promoters and promoter systems are disclosed, and uses thereof. Polynucleotides disclosing Benzoate Response Elements are also disclosed. Official Gazette of the United States Patent and Trademark Office Patents, APR 27 2010, Patent no. US 07705203