Thomas H. Roberts *Curriculum vitae*



PERSONAL Australian citizen, married with two children aged 15 and 13.

QUALIFICATIONS

Doctor of Philosophy (PhD) in plant biochemistry (1995), University of Sydney
PhD thesis title: *Glyoxylate Aminotransferases and Ureide Catabolism in the Developing Fruits of Legumes*
Bachelor of Science in Agriculture (BScAgr, Hons II Div. 1; 1989), University of Sydney

CAREER SUMMARY

I am a **plant biochemist** and a **food chemist**. I have an Australian educational background in **agricultural science**, majoring in agricultural chemistry, and a PhD in plant biochemistry. For nearly five years in the 1990s I conducted postdoctoral research in plant biochemistry and molecular biology in Scandinavia and was also employed as a copy editor. I then worked for 11 years at **Macquarie University**, Sydney, firstly as a laboratory manager and Research Fellow, and then as a Lecturer/Senior Lecturer in cell and developmental biology and in molecular plant biology.

I joined the **University of Sydney** as Senior Lecturer in 2012, expanding my teaching and research interests to include molecular plant pathology and the chemistry and biochemistry of foods (and animal feed). I was promoted to Associate Professor in 2018. I have spent two periods on sabbatical with world-leading researchers at the **Weizmann Institute of Science** in Israel (2011) and at **Oxford University** in the U.K. (2015). My recent and current research funding was provided by the **Grains Research and Development Corporation** (GRDC), the **Australian Research Council** (ARC), and the **Bruce Veness Chandler Fund**.

CURRENT POSITIONS

Associate Professor in Food Chemistry and Biotechnology 40:40:20 (40% research, 40% teaching, 20% governance/leadership/engagement)
Plant Breeding Institute
School of Life and Environmental Sciences (SOLES)
https://www.sydney.edu.au/science/schools/school-of-life-and-environmental-sciences.html
Faculty of Science
University of Sydney, NSW 2006, AUSTRALIA

Theme Leader for Quality Food since September 2021
Sydney Institute of Agriculture - https://sydney.edu.au/agriculture/

thomas.roberts@sydney.edu.au
https://sydney.edu.au/science/about/our-people/academic-staff/thomas-roberts.html

PREVIOUS POSITIONS

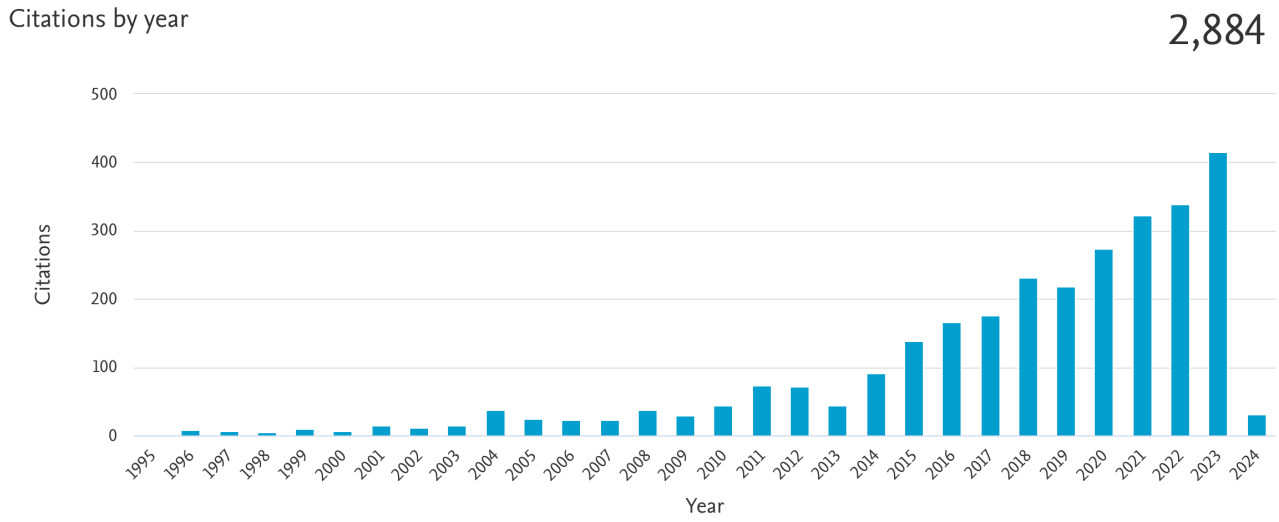
July 2015-Jan 2016	**Academic Visitor** with Renier van der Hoorn Department of Plant Sciences, and Somerville College Oxford University Oxford, U.K.
2012-2015	**Senior Lecturer** 40:40:20 Department of Plant and Food Sciences Faculty of Agriculture and Environment University of Sydney
Jan to June 2011	**Visiting Scientist** with Robert Fluhr, Department of Plant Sciences, Weizmann Institute of Science, Israel
2005-2011	**Lecturer** (40:40:20) and then **Senior Lecturer** (40:40:20) from 2009, Department of Chemistry and Biomolecular Sciences, Macquarie University, Sydney
2004	**Lecturer** (40:40:20), Department of Biological Sciences, Macquarie University
2003	**Lecturer** (contract basis), Department of Biological Sciences, Macquarie University
2000-2004	**Research Fellow** with Robert D. Willows, Department of Biological Sciences, and as a laboratory manager for the Macquarie University Centre for Analytical Biotechnology, Macquarie University

1997-2000	**Research Fellow** with Jørn Hejgaard, Biochemistry and Nutrition, BioCentrum-DTU, Technical University of Denmark, and with Søren K. Rasmussen, Plant Research Department, Risø National Laboratory, Denmark
1995-1996	**Research Associate** with Jim Hourigan, School of Food Sciences, University of Western Sydney, and with Robert W. Sleigh, Division of Food Science and Technology, CSIRO
1994-1995	**Postdoctoral Fellow** with Ian Max Møller, Department of Plant Physiology, Lund University, Sweden
1989-1994	**PhD Student** (Alexander Hugh Thurburn PhD scholarship) supervised by Edith M. Lees and Les Copeland, Department of Agricultural Chemistry and Soil Science, University of Sydney

SUMMARY OF PEER-REVIEWED PUBLICATIONS (22 Jan 2024)

Book chapters	3
Refereed journal articles	73 (last author 55%)
Citations (Scopus)	2,884
H-index (Scopus)	28

The graph below shows my citations over time in Scopus (22 Jan 2024).



RESEARCH FUNDING SINCE CURRENT APPOINTMENT (2012)

05/09/2022 – 31/12/2026	**Roberts TH**. Effects of crop production under heat stress and high atmospheric CO_2 on the food grain chemistry of wheat, barley and chickpea. Bruce Veness Chandler Fund. **$781K**.
01/04/2018 – 31/03/2021	Park RF, **Roberts TH** and van der Hoorn. *Cereals and rusts: molecular interactions for plant defence and food security*. Discovery-Projects, Australian Research Council (ARC). **$510K**. This project was extended to 31/12/2023 due to delays caused by COVID-19.
01/07/2016 – 30/06/2021	**Roberts TH**, Tan DKY and Bishop TFA. *Expanding options for sorghum - food and distilling*. Grains Research and Development Corporation (GRDC). **$478K** for subcontract to the University of Sydney from Charles Sturt University (total value of GRDC grant $1,539K)
30/07/2013 – 30/07/2015	Selle PH and **Roberts TH**. *The factors influencing sorghum starch digestibility in broiler chickens.* Rural Industries Research and Development Corporation (RIRDC). **$130K**.
2013	**Roberts TH**. *Gene and protein discovery and analysis suite*. University of Sydney Faculties of Sciences Research Equipment and Infrastructure Scheme 2012. **$84K** (Total $164K including $40K from personal 'start-up' funds and $40K from the Faculty of Agriculture and Environment.)
2014	**Roberts TH**. *Biochemical analysis of mustard seed samples*. Consultancy agreement (6-week project) with Australian Agricultural Technologies Ltd. **$15.4K**
2013	Tan DKY, **Roberts TH**, Bange M and Atwell BJ. *The physiology of cotton crop nutrition, shade and waterlogging*. Cotton Research and Development Corporation (CRDC). **$28.5K**
2013	Tan D and **Roberts TH**. *Is slow fermentation activity in hypoxic cotton seedlings responsible for its poor performance under waterlogging?* Cruiser Research and Development Fund. **$9.5K**

MAIN AREAS OF PROFESSIONAL ACHIEVEMENTS

Research

- **Current interests:** Effects of crop production under heat stress and high atmospheric CO_2 on the grain quality of wheat, barley and chickpea; Protease-protease inhibitor interactions in the barley/barley leaf rust pathosystem; Food applications of sorghum grain; Effects of malting on phenolic compounds in sorghum grain; Effects of cultivar x location on phenolic compounds in sorghum grain; Morphology and biochemical properties of Australian native grains; Food and beverage applications of Australian cultivars of triticale; Plant serpin genes and protein function
- **Previous contributions:** Nitrogen metabolism in legumes; Biochemistry of the plant mitochondrial electron transport chain; Serpins in unicellular organisms; Enzymes in chlorophyll biosynthesis; Wheat grain proteomics; Properties of pomegranate seed oil; Gene silencing in *Arabidopsis*; Methods for protein/allergen extraction from peanuts; Growth and molecular responses of plants to oxygen deprivation; Development of techniques for the study of programmed cell death in barley germination; β-amylases in wheat; Mechanisms of salt tolerance and seed quality of Australian native rices; Diversity and evolution of pigments in rust fungi; Effects of the application of plant leaf extracts on the defence of cereals against abiotic and biotic stresses
- **Key Researcher** in the Australian Research Council Cooperative Research Centre for Innovative Grain Food Products (Grain Foods CRC; 2005–2009)
- **Previous funding support** from Macquarie University (multiple schemes); Grain Foods CRC; Australian Research Council (ARC) Large Infrastructure, Equipment and Facilities (LIEF)
- **Publication output**: three book chapters; 71 refereed journal articles including primary papers in *Journal of Biological Chemistry* (2000, 2010), *Journal of Experimental Botany* (2003, 2012)*, PNAS* (2002), *Phytochemistry* (2019), *Plant Journal* (2015) and *Plant Physiology* (1996, 2010), and reviews in *Critical Reviews in Food Science and Nutrition* (2021), *Journal of Cereal Science* (2016), *Molecules* (2013), *Physiologia Plantarum* (2012) and *Functional & Integrative Genomics* (2008); 69 conference abstracts.
- **Publication output in since 2012** (current appointment): one book chapter, 53 refereed journal articles and 32 conference abstracts
- **Publication metrics** (22 Jan 2024): Scopus total citations = 2,884, h-index = 28; Google Scholar total citations = 4,578, h-index = 33
- **ISI Web-of-Science *Highly Cited Paper*** (top 1% of its academic field): Khoddami A, Wilkes MA and **Roberts TH** (2013). Techniques for analysis of plant phenolic compounds. *Molecules* **18**, 2328–2375
- **Six career-best primary papers** - not based on citations or impact factor alone (reverse chronological order)

  1. Rahman S, Copeland L, Atwell BJ & **Roberts TH** (2021). Elevated CO_2 differentially affects the properties of grain from wild and domesticated rice. *Journal of Cereal Science* **100**, 103227 (8 pp)

  Study of the differential effects of plant growth and development under elevated atmospheric CO_2 on the grain properties of two wild rice species endemic to northern Australia compared to domesticated rice.

  2. Walczyk NE, Smith PM, Tovey E and **Roberts TH** (2017). Peanut protein extraction conditions strongly influence yield of allergens Ara h 1 and 2 and sensitivity of immunoassays. *Food Chemistry* **221**, 335–44

  Systematic study of the effectiveness of common extraction conditions (20 buffers, defatting reagents, extraction time/temperatures, processing, extraction repeats) on crude protein and Ara h 1 and 2 yields.

  3. Lampl N, Budai-Hadrian O, Davydov O, Joss TV, Harrop SJ, Curmi PMG, **Roberts TH** and Fluhr R (2010). *Arabidopsis* AtSerpin1: crystal structure and *in vivo* interaction with its target protease RESPONSIVE TO DESICCATION-21 (RD21). *Journal of Biological Chemistry* **285**, 13550–13560

  First X-ray crystal structure of a plant serpin and first identification and confirmation of an in vivo *target protease for a plant serpin.*

  4. Roberts TH, Marttila S, Rasmussen SK and Hejgaard J (2003). Differential gene expression for serine proteinase suicide-substrate inhibitors (serpins) in the vegetative and grain tissues of barley. *Journal of Experimental Botany* **54**, 2251–2263

  First major study of serpin expression in plant vegetative tissues. Revealed expression of serpin genes in leaves and roots during development. Localized serpins to specific tissues within the grain.

  5. Østergaard H, Rasmussen SK, **Roberts TH** and Hejgaard J (2000). Inhibitory serpins from wheat grain with reactive centers resembling glutamine-rich repeats of prolamin storage proteins: cloning and characterization of five major molecular forms. *Journal of Biological Chemistry* **275**, 33272–33279

  A major contribution towards understanding the serpin complement of wheat grain and the in vitro *inhibitory specificity of wheat grain serpins. First major breakthrough on the functions of plant serpins.*

  6. Roberts TH, Fredlund KM and Møller IM (1995). Direct evidence for the presence of two external NAD(P)H dehydrogenases coupled to the electron transport chain in plant mitochondria. *FEBS Letters* **373**, 307–309

  Demonstrated diphenyleneiodonium (DPI) could distinguish two distinct NAD(P)H dehydrogenases on the outer surface of the plant inner mitochondrial membrane.

- **Research and postgraduate research training:** planning, delivering, managing and evaluating
- **Higher degree research (HDR) supervision record**: Lead Supervisor of 10 completed PhD graduates, one completed MPhil graduate, and one completed MAgEnv graduate (in reverse chronological order):
    - **Rahman, Sayedur** (2022). *Canopy architecture, carbon gain and grain properties of native Australian rices: Effects of elevated atmospheric carbon dioxide* (PhD, Sydney)
    - **Huang, Ting-Chun** (2020). *Identity and subfamily classification of serpins in bread wheat (*Triticum aestivum*) and their expression pattern in tissues, under plant stresses and during embryogenesis* (MAgEnv, Sydney)
    - **Shenouda, Samar** (2020): *Beta-amylase genes in common/bread wheat (*Triticum aestivum*)* (PhD, Sydney)
    - **Yichie, YoavB** (2019). *Salinity tolerance of wild rice accessions from northern Australia* (PhD, Sydney)
    - **Wang, Erpei** (2018). *Pigments in rust fungi: Biosynthesis, role in plant-pathogen interactions, and evolution* (PhD, Sydney)
    - **Khoddami, Ali** (2016). *Phenolic compounds in grains of Australian-grown sorghums: Quantitative analyses including impacts of malting and effects on broiler nutrition* (PhD, Sydney)
    - **Siqueira Reis, Rodrigo** (2015). *Role of double-stranded RNA binding proteins in the Arabidopsis miRNA pathway* (PhD, Sydney)
    - **Daneri-Castro, Sergio Nicolas** (2015). *Germination-related cell death in the aleurone layer of malting barley* (PhD, Sydney)
    - **Walczyk, Nicole** (2013). *The impact of elevated carbon dioxide concentration and other environmental conditions on the allergenicity of peanuts* (PhD, Macquarie)
    - **Ersoy, Renan** (2011). *Functional expression analyses of serpin genes in Arabidopsis and rice* (PhD, Macquarie)
    - **Francis, Sheila** (2010). *Identification and expression of serpin genes in rice* (MPhil, Macquarie)
    - **Ahn, Joon-Woo** (2009). *Functional characterization of serpins in plants and green algae* (PhD, Macquarie)
- **Current supervision**: I am the Lead Supervisor of three PhD students:
    - **Jacob Humphries**: *Controlled brewing trials comparing triticale malt with wheat and rye malts*
    - **Farkondeh Abedi**: *Biochemical properties of Australian native grains*
    - **Jennifer Le**: *Molecular interactions between barley and barley leaf rust*
- **Industry collaborations since 2012**: Professional research relationships with 4 Pines, Advanta Seeds, Australian Agricultural Technologies (AAT), Boortmalt, FBFD Pty Ltd, GenTech Seeds, LangTech International, Nuseed, Peanut Company of Australia (PCA), Radicle Seeds, Smart MCs
- **Research profiles**:
  Google Scholar: https://scholar.google.com/citations?user=3kIeKUkAAAAJ&hl=en&oi=ao
  ResearchGate: https://www.researchgate.net/profile/Thomas_Roberts?ev=hdr_xprf
  Web-of-Science: https://www.webofscience.com/wos/author/record/H-2071-2012?state=%7B%7D
  Orcid: http://orcid.org/0000-0003-3831-3240

Awards

- **SUPRA Supervisor of the Year 2022** awarded by the Sydney University Postgraduate Research Association. Winner 'for outstanding knowledge, commitment and care'.

Teaching

- **Development, delivery and evaluation of undergraduate coursework**: *University of Sydney* (2012-present): AGEN1006 Biological Chemistry; ENVI1003 Global Changes: Food, Water, Climate; AGEN2001 Plant Function (joint Coordinator 2014-2018); BCHM2X02 Protein in Cells; AGCH3025/FOOD3002 Chemistry and Biochemistry of Foods (Coordinator 2013-2020, 2022-present), AGCH3026 Food Biotechnology, AGEN3004/FOOD3001 Food Processing and Value Adding, BIOL3020 Applied Plant Function; FOOD4002 Future Foods (developer and Coordinator 2021-present); AFNR5107 Masters Principles of Biochemical Analysis. *Macquarie University* (2003-2011): 1st-year The Thread of Life, 2nd-year Plant Structure and Function, 3rd-year Cell and Developmental Biology (Coordinator) and 3rd-year Plant Cells and Molecules (Coordinator).
- Yearly casual teaching of 3rd-year Plant Cells and Molecules at the Management Development Institute of Singapore 2005–2009

University Service highlights

- **Postgraduate Coordinator** for the Agriculture & Food Theme in SOLES since January 2024
- **Academic Board Nominee** for the Horizon Fellowships Scheme Selection Committee for the Sydney Law School (July-August 2023)
- **Theme Leader for Quality Food** of the Sydney Institute of Agriculture since September 2021

- Member of the SOLES **Advanced Studies Committee** (2021 to present) as the representative for Food Science
- **Stream Coordinator** for Bachelor of Science/Bachelor of Advanced Studies (Food and Agribusiness) since 2019
- Member of the Life, Earth and Environmental Sciences **LEES Building Research Advisory Group** since 2019
- **Academic Leader** of the annual Sydney Institute of Agriculture postgraduate 3-day excursions since 2017
- Member of the SOLES website working party (July 2016 to June 2017) designing the research website network for all researchers in SOLES
- Participant in workshops for the Molecular, Genetics, Nutrition, Microbiology and Disease cluster and Plant Sciences cluster to define Majors (July 2016)
- Member of the University of Sydney Life, Earth & Environmental Science (LEES) **Research Working Party** (2014–2015) to provide the basis for a funding submission for construction of new buildings at USyd
- **Postgraduate Coordinator** for the Department of Plant and Food Sciences, University of Sydney (2012–2015)
- Member of the **Postgraduate Management Committee** and the **Board of Graduate Studies**, Faculty of Agriculture and Environment, University of Sydney (2012–15)
- **Seminar coordinator** for Department of Chemistry and Biomolecular Sciences, Macquarie University and Department of Plant and Food Sciences, University of Sydney (2012–15)
- Member of Level B Local **Promotions Committee** (2013)
- Member of Macquarie **University Institutional Biosafety Committee** (IBC; 2004–11)

Membership of societies

- Member and former **Plant Science Education Representative** (2016–2019) of the Australian Society of Plant Scientists (ASPS)
- Member of Australasian Grain Science Association (AGSA)
- Member of the Australian Society for Biochemistry and Molecular Biology (ASBMB)
- Member of the Institute of Food Technologists (IFT)
- Member of the Australian Institute of Food Science and Technology (AIFST)

Other professional activities

- **Associate Editor** of the CSIRO journal *Functional Plant Biology* since October 2018. All manuscripts processed were in the field of molecular plant biology.
- **Journal article refereeing:** *Agri Gene; Agriculture; Agronomy; Applied Sciences; Biological Chemistry*; *BMC Chemistry*; *BMC Complementary and Alternative Medicine; BMC Evolutional Biology*; *BMC Genomics*; *BMC Plant Biology; Brazilian Journal of Botany*; *Cell Biology International*; *Cereal* Chemistry; *Chemistry Central Journal*; *Cogent Food and Agriculture; Computational and Structural Biotechnology Journal; Food Chemistry; Food Science and Nutrition*; *Frontiers in Plant Science*; *Functional Plant Biology*; *International Journal of Food Science and Technology*; *Journal of Agricultural and Food Chemistry*; *Journal of Cereal Science*; *Journal of Essential Oil Bearing Plants*; *Journal of Plant Physiology*; *Journal of Food Science and Technology*; *Journal of Plant Physiology*; *Journal of Proteomics*; *Journal of the American Oil Chemists Society*; *Journal of the Science of Food and Agriculture*; *Marine Drugs; MethodsX*; *Molecular Genetics and Genomics*; *Nature Protocols*; *New Phytologist; Peer Journal*; *Physiologia Plantarum*; *Phytochemistry*; *Plant Biology*; *Plant Physiology and Biochemistry; Plant Science*; *PLoS One*; *Proteomics Journal*; *Scientific Reports*; Separation *and Purification Technology*, *Starch-Stärke*
- Acknowledged copy editor of 24 journal articles
- **Thesis examination**: Examiner of 11 PhD theses from University of Adelaide, Monash University, University of New South Wales, University of Sydney, University of Western Australia, and Western Sydney University. Examiner of 10 Masters theses.
- **Research proposals reviewing for funding bodies**: Reviewer for the Australian Research Council (ARC) for DECRA, Discovery-Projects and Future Fellowships schemes; Comisión Nacional de Investigación Científica y Tecnológica (CONICYT; National Commission for Scientific and Technological Research, Chile); Fondo Nacional de Desarrollo Científico y Tecnológico (FONDECYT; National Fund for Scientific and Technological Development); Fonds voor Wetenschappelijk Onderzoek (FWO, Research Foundation – Flanders, Belgium); Israel Science Foundation; Minerva Stiftung (Minerva Research Initiative, Germany).
- **Conference organization**: Member of Scientific Advisory Committee for the 6th and 7th Symposia on the Structure, Function and Biology of Serpins (2011 and 2015, respectively); Member of the Organizing Committee for the 65th Australasian Grain Science Conference (2015)
- **Communication of recent research in the media**: In the March/April 2023 issue of the Grains Research and Development Corporation (GRDC) magazine "Groundcover" (National edition), research I led on food applications of Australian sorghum was featured in an article by Claire Crawford entitled "*Project aims to expand*

options for Australian sorghum": see https://groundcover.grdc.com.au/crops/cereals/project-aims-to-expand-options-for-australian-sorghum

Non-work-related activities

- **Football (soccer) coach** for local club Leichhardt Saints: Under 15 Girls 2023, Under 14 Girls 2022, Under 13 Girls 2021, Under 12 Girls 2020, Under 11 Girls 2019, Under 10 Mixed 2018
- **Bass guitarist** in Jazz Workshop Australia advanced combo (2023 Term 1 and 2, 2022 Term 1 and 2, 2021 Term 1 and 2), at local hotel gigs including the London Hotel, Balmain (Sydney), and in End-of-Year Celebrations at USyd