Research

Scientific contributions and publication record

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Scientific publications and thought leadership

My advisory work is grounded in a long research career spanning crop physiology, sugarcane biology, biomass productivity, biotechnology, carbon allocation and bioeconomy strategy.

I have authored more than 200 peer-reviewed publications and contributed to national and international research programs focused on improving the performance, value and resilience of biological production systems.

This page highlights selected areas of contribution rather than attempting to reproduce a complete publication list.

Research profile

- More than 200 peer-reviewed scientific publications
- h-index: 45
- International research collaborations across crop science, biotechnology and agricultural innovation
- Former executive leadership roles in research strategy and delivery
- Research focus on biomass formation, carbon partitioning, sink strength, crop improvement and technology translation

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Google Scholar

Selected publication themes

Biomass productivity and crop performance

Research in this area has focused on the biological and physiological controls that determine biomass formation, yield potential and resource-use efficiency in crop systems.

Topics include:

- biomass accumulation and growth dynamics

- carbon allocation between structural biomass and storage products
- sink strength and source-sink relationships
- physiological limits to productivity
- implications for crop improvement and R&D strategy

Sugarcane biology and improvement

A substantial part of my scientific career has focused on sugarcane as a high-biomass crop and industrial feedstock.

Key areas include:

- sugar accumulation and internode development
- sucrose metabolism and carbon partitioning
- crop physiology and yield formation
- genotype × environment effects
- opportunities for sugarcane as a bioeconomy platform

Biotechnology, metabolism and technology translation

My work has also examined how molecular and metabolic insight can be translated into practical crop improvement strategies.

This includes:

- metabolic regulation of growth and storage
- biotechnology approaches to crop improvement
- integration of omics data with physiology and field performance
- alignment of discovery research with production constraints
- technology pipeline design and review

Selected publications

Botha FC (2026)

Energetic Constraints and Carbon Efficiency During Sucrose Storage in Sugarcane Culms.

Agronomy **16**:913

DOI: https://doi.org/10.3390

Botha, F. C., & Henry, R. J. (2026)

An Integrated Framework for Carbon Recycling and Energy Economy in Hypoxic Plant Tissues: Roles of PEPC, Rubisco and Pyrophosphate-Driven Metabolism.

Preprints

DOI:https://doi.org/10.20944

Botha, F. C., & Henry, R. J. (2025)

Assessing lignocellulose quality across growth stages in diverse sugarcane genotypes.

Sustainability **17**:8481

DOI:https://doi.org/10.3390/su17188481

Botha FC (2018)

Advances in understanding of sugarcane plant growth and physiology. In P. Rott (Ed.), Achieving sustainable cultivation of sugarcane (Vol. 2). Burleigh Dodds Science Publishing.

DOI: 10.32907/RO-106-1013