

GIAMPIERO CAI – curriculum vitae



Individual websites

Scopus: <https://www.scopus.com/authid/detail.uri?authorId=7202116747>

Website of Ateneo: <https://docenti.unisi.it/it/cai>

ResearchGate: https://www.researchgate.net/profile/Giampiero_Cai

Instruction

High school diploma "Liceo Scientifico" (Colle Val d'Elsa, Italy, 1982)

Degree in Biological Sciences, University of Siena (Italy, 1987) 110 laude.

PhD in Environmental Biology at the University of Siena (Italy, 1993)

Work experience

1993-94; Biocine-Chiron (Siena, Italy): research contract

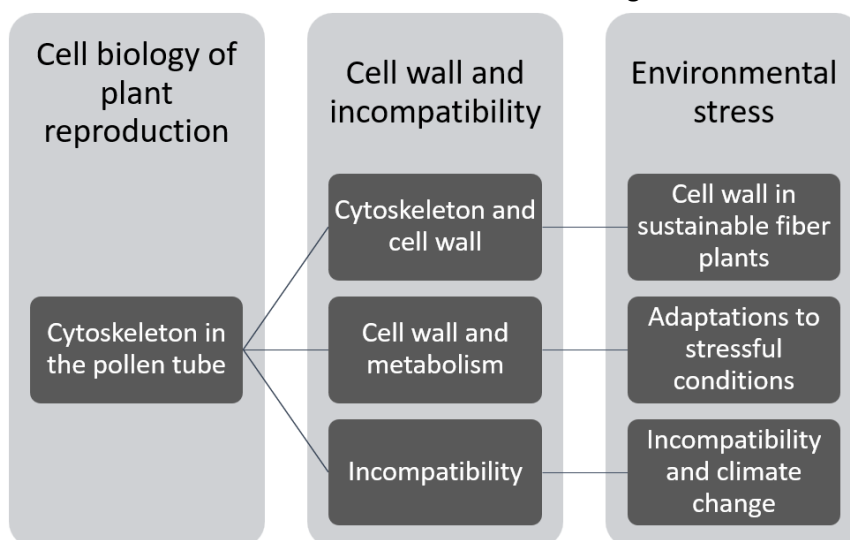
1994-2001; University of Siena (Siena, Italy): permanent position as Technical Assistant

2001 - 2015; University of Siena (Siena, Italy): Researcher (permanent position)

2015 - present; Associate Professor of Botany

Scientific activity

The major research activities are listed below and illustrated in the figure.



1. Cell biology of plant reproduction.

For a long time, this was the main research activity, also because of the expertise and previous activities in the group. In this case, my interest was mainly focused on the cytoskeleton and the role of this set of proteins in pollen tube growth. This was basic research aimed at understanding some of the molecular mechanisms underlying the process of polarized pollen tube growth. I contributed to the characterization of microtubule motor proteins (kinesins) and to the definition of their role in organelle and vesicle trafficking.

2. Cell wall and incompatibility

The next phase of my research (which is still ongoing, albeit to a lesser extent) involved the study of the cell wall in relation to the incompatibility process. The transition from the cytoskeleton to the cell wall was rapid because the cytoskeleton is actively involved in the synthesis and deposition of cell wall polysaccharides. This line of research focused on the distribution of callose synthase and cellulose synthase in pollen tubes in relation to actin filaments, microtubules, and the endomembrane system. This link was further strengthened by the study of enzymes (such as sucrose synthase) involved in both metabolism and polysaccharide synthesis. The topic of incompatibility was taken up because in some biological systems self-incompatibility

also occurs as cell wall modification, for example through the activity of enzymes such as transglutaminase (TGase). TGase is a family of calcium-dependent acyl transferases that catalyze the transfer of an acyl group from glutamine residues to primary amines, including polyamines (PAs). In addition, TGase can interact with microtubules and actin filaments; it should be considered that the cytoskeleton is one of the targets of the incompatibility process.

3. Environmental stress

The third and most recent research activity concerns some of the aspects just described, but from the perspective of so-called "environmental stresses", i.e., all those abiotic conditions that lead to plant damage. Previous research on the cell wall has extended from pollen to the study of fibrous plants such as hemp and nettle. The latter are so-called "sustainable" plants because they can be grown with little energy and can absorb environmental pollutants. The study of the cell wall motivated the interest in understanding how the "cell wall + metabolism" system is a barrier against environmental stress; therefore, the focus was on modifications (direct and indirect) that can increase plant tolerance to stressful conditions. The research activity on self-incompatibility has been reviewed in the light of climate change, with the specific intention of identifying how environmental stresses may alter the self-incompatibility barrier in crop plants. These research activities aim to study the effects of specific stress conditions (heat, cold, drought, UV) on the growth and productivity of plants of commercial interest (tomato, olive, etc.).

Scientific responsibility for international and national research projects

1. European Community research project to characterize transfer cells during the development of maize endosperm (1997-2000, IV Framework Program).
2. Research Project of the University of Siena (PAR) to study the movement of pollen organelles along microtubules (1999).
3. Research funding by the European Community for a project on the development of genetic and molecular tools to reconstruct functional domains in seed (2000-2003, Fifth Framework Program).
4. Research project of the University of Siena (PAR) to study the motility of pollen organelles along microtubules and actin filaments (2002 and 2004).
5. Research project of the University of Siena (PAR) for the characterization of kinesin in pollen tubes (2007).
6. Funding from the Ministry of University and Scientific Research (PRIN) for the characterization of cell wall and cytoskeleton interactions in pollen tubes (2008)
7. Funding from the Tuscany Region for measure 124 (PSR 2007-2013): UN FILO D' OLIO (MODOLIVI), for studying the effects of olive wastewater on the cytological and molecular characteristics of crops.
8. Funding from the Tuscany Region for the Measure 124 Project of PSR 2007-2013: APISALUS - Development of innovative technologies for the protection of bee health and the improvement of honey.
9. Funding from the Tuscany Region for the Toscolata project: nutraceutical enhancement of innovative Tuscan cocoa-based food products, PRAF 2012-2015 Measure 1.2.e.
10. Funding from the Tuscany Region for the project TOSCO MAGNATUM TRACE: Molecular and digital tracking of Tuscan white truffle products, in the PRAF 2012-2015 Measure 1.2.e.
11. Funding from the Ministry of University and Scientific Research (PRIN) for the study of the process of self-incompatible in fruit trees (2015)
12. Funding from the Tuscany Region for the BASIQ project (Sustainability, Quality, and Identity of Food) under the 2014/2020 RDP.
13. Funding from the Tuscany Region for the INNOVACEREALI project under the 2014/2020 RDP.
14. Funding from the Tuscany Region for the development of artificial pollination systems in olive trees (OLIMPOLLI, 2018-2021)
15. Funding from the Tuscany region for the PIF Drago project for the characterization and use of flours derived from locally grown wheat (2019-2020).

16. Funding from the Tuscany region for the traceability of Brettanomyces in the wine supply chain (NoBrett project)

Responsibility for scientific research entrusted to qualified public or private institutions

Participation as a mentor in the [CABERNET](#) project funded by the Luxembourg FNR from 01-09-2017 to 31-08-2020

Direction or participation in editorial boards of scientific journals

1. Guest Editor for the special issue on "Pollen tube growth", [Plants, 2013](#) and [Plants, 2016](#)
2. Guest Editor for the special issue on "Pollen tube and reproduction" [IJMS, 2018](#)
3. Guest Editor for the special issue on: Understanding the effects of plant nutrients on cell wall-related processes, [Frontiers in Plant Sciences, 2017](#)
4. Guest Editor for the special issue on "Pollen Tube", [Plants, 2019](#)
5. Guest Editor for the special issue on "Regulation of pollen tube growth", [Frontiers in Plant Sciences, 2019. Second edition](#) in 2022
6. Guest Editor for the special issue on "Environmental and plant stress", [IJMS, 2020-2021. Second edition](#) in 2022
7. Guest Editor for the special issue on "Pollen-Pistil Interaction", [IJMS, 2021-2022](#)
8. Guest Editor for the Research Topic of Frontiers in Plant Science on "[Polyamines and Longevity - Role of Polyamine in Plant Survival](#)" (2022)
9. Since 2021, [Associate Editor](#) for Frontiers in Plant Science.
10. Since 2022, [Board Member](#) for Scientific Reports.

Reviewer of manuscripts

Reviewer of manuscripts submitted to the following journals: Plant Sexual Reproduction, Journal of Cell Science, Plant & Cell Physiology, The Plant Cell, Planta, Plant Physiology, Transgenic Research, Journal of Experimental Botany, Cytoskeleton, New Phytologist, BMC Biochemistry, PlosOne, Nature Communications, Bioscience Biotechnology and Biochemistry, Frontiers in Plant Science

The [Publons website](#) reports 234 manuscript review activities.

International awards

FEBS scholarship to participate in a practical course at the Institute of Biochemistry of Aarhus (DK), 1990.
Scholarship for the annual meeting of the *Cytoskeletal European Forum* (Dundee, Scotland, 1994)
Scholarship for the annual meeting of the *Cytoskeletal European Forum* (Stockholm, Sweden, 1995)
Best oral presentation at the XVII Congress on sexual reproduction in plants (Lublin, Poland, 2002)

Review of research proposals

National Science Foundation (NSF), Department of Agriculture of the United States, University of Padua, Research Foundation of Flanders (Fonds Wetenschappelijk Onderzoek - Vlaanderen, FWO), Trentino Region, Evaluator for VQR (Italy) 2011/2014 and 2015/2019, National Science Center of Poland

Didactic activity

Teaching activities as researcher at the University of Siena

2001/02	Laboratory of Systematic Botany for the Degree Course in Biological Sciences, Evolutionary Curriculum	
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From 2002/03 to 2005/06	Cellular Technologies - Laboratory of Cell Biology for the Degree Course in Biological Sciences, Evolutionary Curriculum	1 CFU
From 2001/02 to 2008/09	Plant Biology and Plant Biotechnology for the degree program in Biotechnology	6 CFU
2007/08 and 2008/09	Applied Botany for the Degree Program in Biotechnology	
2007/08 and 2008/09	Biochemistry of receptors, for the LS-TAIE degree course	6 CFU
2009/10, 2010/11, 2013/14, 2014/15	"Interactions between plant cells and the environment" for the LM-ESA degree course	6 CFU
From 2009/10 to 2014/15	Botany for the degree course in Biotechnology	6 CFU
2012/13 and 2013/14	Plant Biotechnology for the Bachelor of Science in Biotechnology	3 CFU

Teaching activities as associate professor at the University of Siena

2015/16	Plant biotechnology for the master's degree in Molecular and Cellular Biology	6 CFU
	Plant Biotechnology for the Degree Course in Biotechnology	6 CFU
	"Interactions between plant cells and the environment" for the ESA Master's Degree Program	6 CFU
2016/17	Plant Biotechnology for the Degree Course in Biotechnology	6 CFU
	Botany for the degree course in Environmental and Natural Sciences	9 CFU
	"Interactions between plant cells and the environment" for the ESA Master's Degree Program	6 CFU
	Plant biotechnology for the master's degree in Molecular and Cellular Biology	6 CFU
2017/18	Plant Biotechnology for the Degree Course in Biotechnology	6 CFU
	Botany for the degree course in Environmental and Natural Sciences	9 CFU
	"Interactions between plant cells and the environment" for the ESA Master's Degree Program	6 CFU
	Plant biotechnology for the master's degree in Molecular and Cellular Biology	6 CFU
2018/19	Plant Biotechnology for the Degree Course in Biotechnology	6 CFU
	Botany for the degree course in Environmental and Natural Sciences	9 CFU
	"Interactions between plant cells and the environment" for the ESA Master's Degree Program	6 CFU
	Plant biotechnology for the master's degree in Molecular and Cellular Biology	6 CFU
	Sustainability, Quality and Safety of Agri-food Production - Traceability of Agri-food Production	2 CFU
2019/2020	Plant Biotechnology for the Degree Course in Biotechnology	6 CFU
	Botany for the degree course in Environmental and Natural Sciences	9 CFU

	"Interactions between plant cells and the environment" for the ESA Master's Degree Program	6 CFU
	Plant biotechnology for the master's degree in Molecular and Cellular Biology	6 CFU
	Sustainability, Quality and Safety of Agri-food Production - Traceability of Agri-food Production	2 CFU
2020/21	Plant Biotechnology for the Degree Course in Biotechnology	6 CFU
	Botany for the degree course in Environmental and Natural Sciences	9 CFU
	"Interactions between plant cells and the environment" for the ESA Master's Degree Program	6 CFU
	Plant biotechnology for the master's degree in Molecular and Cellular Biology	6 CFU
	Sustainability, Quality and Safety of Agri-food Production - Traceability of Agri-food Production	2 CFU
2021/22	Plant Biotechnology for the Degree Course in Biotechnology	6 CFU
	Botany for the degree course in Environmental and Natural Sciences	9 CFU
	"Plant responses to climate change" for the ESA Master's Degree Program	6 CFU
	Plant biotechnology for the master's degree in Molecular and Cellular Biology	6 CFU
	Sustainability, Quality and Safety of Agri-food Production - Traceability of Agri-food Production	2 CFU
2022/23	Plant Biotechnology for the Degree Course in Biotechnology	6 CFU
	Botany for the degree course in Environmental and Natural Sciences	9 CFU
	"Plant responses to climate change" for the ESA Master's Degree Program	6 CFU
	Plant biotechnology for the master's degree in Molecular and Cellular Biology	6 CFU
	Sustainability, Quality and Safety of Agri-food Production - Traceability of Agri-food Production	2 CFU

Additional teaching activities

- First intensive course on sexual reproduction in plants, funded by the European Community (Siena, 15-29 November 1991).
- Second intensive course on sexual reproduction in plants (Siena, 15-30/01/1993), funded by the European Community.
- Lecturer in reproductive biology of higher plants at the University of Warsaw (Poland) in 1994 (Tempus project).
- Teacher at the III European Course of Plant Reproduction, Siena, from 27/11 to 12/06/1997.
- Teacher at the fifth international doctorate for plant development supported by the European Community (Siena, Italy, 25-28/09/2012)
- Since 2015, lecturer for the teaching in Sustainability organized by the University of Siena.

Participation in teaching committees

1. Member of the teaching staff of the Doctorate in Sciences and Environmental Technologies coordinated by the Department of Environmental Sciences (University of Siena) until 2013.

2. Since March 2016, member of Teaching Committee of the PhD School in Life Sciences coordinated by the Department of Life Sciences (University of Siena).
3. 2015 and 2016: Member of the Joint Committee of the Department of Life Sciences (University of Siena)
4. Member of the Teaching Committee of the three-year degree in Biotechnology from 2009 to 2013 (end date of the degree course).
5. Currently, member of the Single Teaching Committee of the bachelor's degree in Environmental and Natural Sciences, and Master's degree in Ecotoxicology and Environmental Sustainability (University of Siena).

Supervision or co-supervision of doctoral students

Silva Romagnoli. University of Siena, 2003
Valentina Nicolardi. University of Siena, 2007
Diana Persia. University of Siena, 2008
Luigi Parrotta. University of Siena. 2013
Roberto Berni. University of Siena. 2020
Chiara Piccini. University of Siena. 2021
Veronica Conti. University of Siena. 2022
Agata di Noi. University of Siena. In progress
Sara Parri. University of Siena. In progress

Thesis tutor in the last five years

Master's degree in molecular and cellular biology: 3; Degree in Biotechnology: 15; Master's degree in Biodiversity and Nature Conservation: 2; Master's degree in Ecotoxicology and Environmental Sustainability: 6

Metric analysis (18/05/2022)

Documents: 142
Total citations: 3492
h-index: 32

List of publications indexed by Scopus: [Cai, Giampiero - Author details - Scopus](#)

Knowledge of foreign languages

Spoken and written English, intermediate level.

Software skills

The full range of software in the Office package, including Access. Almost daily use of specific software for the analysis of gels, blots, 2D electrophoresis (e.g., ImageJ, QuantityOne, PDQuest) and for the analysis of microscopy images (e.g., ImageJ, AxioVision).