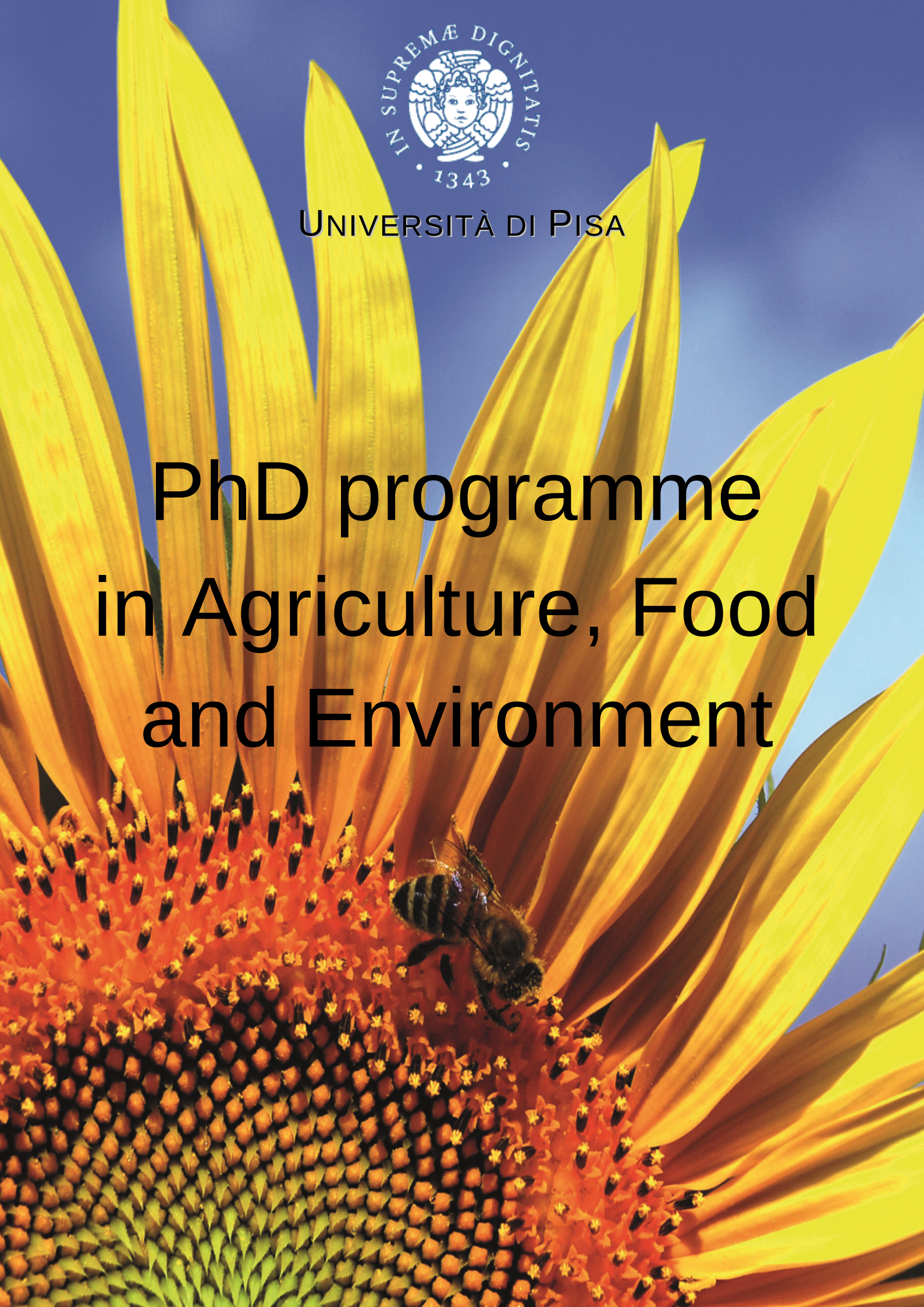
IN SUPREMÆ DIGNITATIS
1343
UNIVERSITÀ DI PISA
PhD programme
in Agriculture, Food
and Environment

PhD programme of Agriculture, Food and Environment
Department of Agriculture, Food and Environment
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The University of Pisa (UNIPI) is one of the most important universities in Italy and has a long tradition of excellence in terms of education and scientific research. The Department of Agriculture, Food and Environment (DAFE) is dedicated to research at the frontiers of agricultural, food and agro-environmental sciences. The Director of DAFE is currently Prof. Alberto Pardossi (*alberto.pardossi@unipi.it*) and the teaching staff consists of nearly 70 professors and researchers.

The PhD programme of Agriculture, Food and Environment is a three-year post-graduate research course at DAFE. The official language of the PhD course is English. The Coordinator of the PhD programme is currently Prof. Andrea Cavallini (*andrea.cavallini@unipi.it*). The Phd programme has as central theme 'Food sustainability'. Its scope is articulated around three main areas: 1) biological basis of food sustainability; 2) sustainability of food production systems; 3) food quality and safety

The course aims at training researchers with an up-to-date, excellent disciplinary ground and with a deep understanding of the systemic implications of their specific field of activity and awareness of the importance of mutual learning with enterprises, administrations and civil society. The Phd programme encourages the development of a common systemic approach through its training program, which will be centered upon the principles of sustainability science, and through its partnership strategy. In this sense, specific agreements with external institutions and/or with some firms are established for specific research themes, with double (university and external institution) supervision. After graduation, the PhD student is expected to be a highly qualified and skilful researcher in the field of basic or applied research. The job placement of PhD graduates is in public or private research centres in the sectors of agriculture, food industry and environment.

The Doctorate Board includes 22 professors at the University of Pisa and 3 senior scientists at various research institutes in Italy or abroad. Currently, 25 PhD students are attending the course or are waiting for the final examination; six students come from overseas universities.

Doctorate Board

SURNAME & NAME	INSTITUTION	QUALIFICATION	*EMAIL*	RESEARCH INTERESTS
1. ANGELINI, Gabriella Luciana	UNIPI	Full Professor	*luciana.angelini@unipi.it*	Agronomy; crop production and quality of food and non-food species
2. ARDUINI, Iduna	UNIPI	Researcher	*iduna.arduini@unipi.it*	Botany applied to agro-ecosystems
3. BARTOLINI, Fabio	UNIPI	Researcher	*fabio.bartolini@unipi.it*	Agricultural economics; bioeconomy; modelling farmer behaviour
4. BRUNORI, Gianluca	UNIPI	Full Professor	*gianluca.brunori@unipi.it*	Agricultural economics; bioeconomy; agricultural and food policy
5. CANALE, Angelo	UNIPI	Researcher	*angelo.canale@unipi.it*	Integrated pest management; insect behaviour
6. CAVALLINI, Andrea	UNIPI	Full Professor	*andrea.cavallini@unipi.it*	Plant genetics
7. CHERUBINI, Paolo	Swiss Federal Institute for Forest, Snow and Landscape Research	Senior Researcher	*paolo.cherubini@wsl.ch*	Tree physiology; silviculture and forest ecology
8. GIOVANNETTI, Manuela	UNIPI	Full Professor	*manuela.giovannetti@unipi.it*	Soil microbiology; mycorrhizal symbioses; rhizosphere beneficial bacteria
9. GUCCI, Riccardo	UNIPI	Full Professor	*riccardo.gucci@unipi.it*	Physiology and management of fruit trees; olive trees; oil quality
10. GUGLIELMINETTI, Lorenzo	UNIPI	Researcher	*lorenzo.guglielminetti@unipi.it*	Plant physiology; plant proteomics
11. LOCONTO, Allison-Marie	INRA (France)	Senior Researcher	*allison-marie.loconto@inra.fr*	Agricultural economics; institutional innovations in conformity assessment systems
12. LUCCHI, Andrea	UNIPI	Ass. Professor	*andrea.lucchi@unipi.it*	Integrate pest management

13. MASSAI, Rossano	UNIPI	Full Professor	*rossano.massai@unipi.it*	Management of fruit crops; fruit quality
14. MAZZONCINI, Marco	UNIPI	Full Professor	*marco.mazzoncini@unipi.it*	Agronomy; crop production and organic agriculture
15. MELE, Marcello	UNIPI	Associate Professor	*marcello.mele@unipi.it*	Lipid metabolism in ruminants; rumen fermentation and methane emission; milk and meat quality.
16. NALI, Cristina	UNIPI	Associate Professor	*cristina.nali@unipi.it*	Air pollution and global change; tree hazard assessment
17. PARDOSSI, Alberto	UNIPI	Full Professor	*alberto.pardossi@unipi.it*	Greenhouse and nursery management; hydroponic technology
18. PEZZAROSSA, Beatrice	CNR	Senior Researcher	*beatrice.pezzarossa@ise.cnr.it*	Trace elements in the soil-plant system; soil quality
19. PICCIARELLI, Piero	UNIPI	Associate Professor	*piero.picciarelli@unipi.it*	Plant ecophysiology; hormonal regulation in model and crop plants
20. PISTELLI, Laura	UNIPI	Researcher	*laura.pistelli@unipi.it*	Plant physiology; herbs and officinal plants
21. RAFFAELLI, Michele	UNIPI	Associate Professor	*michele.raffaelli@unipi.it*	Machines for soil tillage, conservation and no tillage, physical weed control, soil disinfection with physical methods
22. RANIERI, Annamaria	UNIPI	Full Professor	*anna.maria.ranieri@unipi.it*	Food quality, plant stress physiology and biochemistry
23. SERRA, Andrea	UNIPI	Researcher	*andrea.serra@unipi.it*	Animal food production and quality
24. VANNACCI, Giovanni	UNIPI	Full Professor	*giovanni.vannacci@unipi.it*	Fungal plant pathogens; biocontrol of plant diseases; Mycology
25. ZINNAI, Angela	UNIPI	Associate Professor	*angela.zinnai@unipi.it*	Food technology

Programme overview

The PhD programme essentially consists in conducting an original research work under supervision and writing a dissertation (thesis) concerning the following topics:

- food science and technology;
- genomics, proteomics and metabolomics of species of agricultural interest;
- multifunctional agriculture;
- plant and animal production systems, even in urban environment;
- plant physiology, ecology and biochemistry;
- plant, animal and microbial biotechnologies;
- technologies for plant and soil protection and environmental bioremediation.

Each PhD student is supported by a supervisor at DAFE. The PhD students also supervise MSc students and participate in educational activities such as courses, seminars, summer schools and congresses organized by the University of Pisa or other institutions in Italy or abroad, following a tailor-made training plan aimed at achieving in-depth knowledge of specific scientific issues and improving general skills.

The courses and seminars organized in 2017 for all PhD students were the following:

- Course "*Scientific English*". January-February 2017. Lecturer: Dr. Adrian Wallwork.
- Course "*Fundamentals of Statistics for Agricultural Research*". March 2017. Lecturers: Dr. G. Conte (Univ. of Pisa); Prof. N. Macciotta (Univ. of Sassari).
- Course "*Publishing in International Scientific Journals*". June 2017. Lecturer: Dr. G. Benelli (Univ. of Pisa).

Students generally attend other seminars and scientific meetings organized by DAFE. The detailed programme of teaching activities for each year is generally published at the end of January.

At the end of each year, each PhD student holds a public seminar and prepares a report on his/her academic and research activities, which must evaluated and approved by the Doctorate Board.

All the PhD students are invited to spend at least six months in renowned research institutes abroad during the second and/or third year of the course.

At the end of the course, the thesis (in English) is preliminary evaluated by two external referees belonging to other Universities in Italy or abroad.

Finally, the PhD degree is awarded after a public examination in the form of defence of the dissertation before an external committee, which is appointed by the Doctorate Board.

Each candidate must publish at least one scientific paper in an indexed journal (ISI–Web of Knowledge) before graduation.

A list of current PhD projects is reported below.

Current PhD projects

	CANDIDATE	YEAR	THESIS SUBJECT	SUPERVISOR [OPPONENT]
1.	ABOU CHEHADE Lara	2	*Performance of field vegetable cropping systems under organic farming: effects of tillage, cover cropping and weed management.*	M. Mazzoncini & D. Antichi [A. Peruzzi]
2.	ARCURI, Sabrina	3	*Assessment of the impact of global drivers of change on Europe's food security*	G. Brunori [F. Di Iacovo]
3.	BONILLA LOOR, Mario Javier	3	*Physiological and molecular interactions between plants and beneficial fungi*	L. Avio, M. Giovannetti [C. Sbrana]
4.	CIUCCI Francesca	1	*Productive and metabolic response of Maremmana and Aubrac steers maintained in feedlot or grazing systems*	A. Serra & M. Mele [T. Giordani]
5.	IBRAHIM EHDADAN Jamal Ali Mohamed	3	*The effects of agricultural policies on wheat production in Libya. Policy Analysis Matrix Approach (PAM)*	G. Brunori [M. Andreoli]
6.	LO PICCOLO Ermes	1	*Photo-oxidative stress in young and senescent leaves characterized by the presence or not of anthocyanins*	D. Remorini [L. Guidi]
7.	MARTINI, Andrea	3	*Agronomic and phytochemical evaluation of* Avena sativa *L. and* Stevia rebaudiana *Bert. as sources of food and bio-active compounds*	L. Angelini [A. Pardossi]
8.	MATTIONI Dalia	2	*The impact of food provisioning environments on nutrition: the contribution of local food systems*	G. Brunori [F. Di Iacovo]
9.	MOLES Tommaso Michele	2	*Characterization of landrace genotypes of* Solanum lycopersicum	L. Guglielminetti & P. Picciarelli [A. Scartazza]

10. NARI Anita	2	*Producing olive oil with a high nutraceutical and organoleptic quality using innovative operative technique (extraction and storage method)*	Zinnai, A. [F. Venturi]
11. ORLANDO Jacopo Gabriele	1	*The role of multifunctionality principle into social responsibility initiatives*	G. Brunori [M. Rovai]
12. PALLA Michela	2	*"Molecular and functional biodiversity of microrganisms related to food production"*	M. Giovannetti & M. Agnolucci [A. Cavallini]
13. PALMIOLI Lucia	1	*Small farms, small food businesses and sustainable food security*	G. Brunori [F. Di Iacovo]
14. PIRCHIO Michel	2	*Development of innovative machines and application of precision farming instruments for turf grass management and turf quality control.*	M. Fontanelli & M. Volterrani [A. Peruzzi]
15. PUCCI Federico	1	*Towards "zero soil consumption", urban metabolism and ecosystem services in open fields planning*	M. Rovai [G. Brunori]
16. PUCCINELLI, Martina	3	*Enrichment of food crops with selenium. Controlled production of selenium-enriched plants to delay fruit ripening and plant senescence and to increase the nutritive value and the health benefits.*	F. Malorgio & B. Pezzarossa [L. Guidi]
17. RICCIARDI Renato	1	*Semio-chemical and benificial insects for biological control of pests in vineyards*	A. Lucchi [B. Conti]
18. SANTIN Marco	2	*UV-B signalling in fruits: from perception to fruit quality*	A. Ranieri [L. Guglielminetti
19. SOLORZANO ZAMBRANO Liceth Yanina	3	*Functional genomics of Fig (*Ficus carica *L.)*	A. Cavallini [T. Giordani]
20. USAI Gabriele	1	*Structural genomics for plant breeding: the fig (*Ficus carica *L.), an ancient crop with promising perspectives*	L. Natali & F. Mascagni [A. Zuccolo]

21. VANGELISTI, Alberto	3	*Transcriptome analyses through next generation sequencing*	T. Giordani [A. Zuccolo]
22. VICENTE MUNOZ Isabel	1	Application of CRISPR-Cas9 technology to produce mutant fungal strains for biocontrol of crop plant diseases	G. Vannacci & S. Sarrocco [T. Giordani]
23. XIAOGUO, 'Stone' Ying,	3	*Wine quality changes under different storage conditions*	A. Zinnai [F. Venturi]
24. ZAPPARATA, Antonio	3	*Insights on the mechanisms of action of the* Trichoderma-*based biopesticide Remedier®*	G. Vannacci [Q. Migheli]
25. ZOANI, Claudia	3+	*Food traceability and safety for the improvement of products quality and the protection of consumers' interests*	A. Zinnai [A. Ranieri]

Recent (2013-2016) PhD projects

STUDENT	YEAR	DISSERTATION TITLE	SUPERVISOR
BARBERINI, Sara	2014	*Biotechnological approach in Lamiaceae species for the production of antioxidant and antibacterial compounds*	L. Pistelli
BARGHINI, Elena	2014	*The peculiar structure of the olive (*Olea europaea *L.) genome as shown by massively parallel sequencing data*	L. Natali
BATTINI, Fabio	2017	*The production of nutraceutical compounds in food plants as affected by mycorrhizal symbionts and associated microbiota*	M. Agnolucci
BAZZICHI, Nicola	2015	*Utilizzo di specie legnose dell'ambiente collinare e montano della Toscana litoranea per la produzione e l'impiego in opere di ingegneria naturalistica*	F. Cinelli
BORNICE, Marcello	2015	*Physiological study of* Vitis vinifera *L. subsp.* sylvestris	G. Scalabrelli
CAPPUCCI, Alice	2017	*Study of the effects of dietary tannins and vegetable oils on the rumen microbiota composition, methane production and milk fatty acid composition*	M. Mele
CATOLA, Stefano	2016	Transcri*ptomic analysis of* Arabidopsis thaliana *in response to VOCs emitted from* Solanum lycopersicum *subjected to combined abiotic stress (water stress + UV radiation)*	L. Guglielminetti, M. Centritto (CNR, Florence)
CATUREGLI, Lisa	2015	*Monitoring turfgrass species by ground-based and satellite remote sensing*	M. Volterrani
CIACCIA, Corrado	2014	*Effetto combinato del sovescio e del compost sulla dinamica di azoto e fosforo in sistemi colturali arativi biologici senza zootecnia (stockless)*	M. Mazzoncini, S. Canali (CREA, Roma)

COTROZZI, Lorenzo	2017	*Response of oak species (*Quercus ilex, Q. cerris *and* Q. pubescens*) to combined stress to simulate a 2050 global climate change scenario.*	C. Nali
D'ANGIOLILLO, Francesca	2014	*Evaluation of adenine derivatives molecules as Cytokinin-like compounds and their involvement in plant metabolism*	L. Pistelli
DELLA BARTOLA, Michele	2014	*Grapevine rupestris stem pitting-associated virus (GRSPaV) and Vein Necrosis: effect of genetic variability in symptoms expression*	A. Materazzi
FIORINI, Lisa	2016	Effects of a *Trichoderma harzianum* isolate on tomato	G. Vannacci
GAVA, Oriana	2017	*Sustainability performance of biogas chains*	G. Brunori
GENNAI, Clizia	2016	*Gene expression in olive plants under drought conditions*	R. Gucci
GIULIETTI, Valentina	2015	*Le potenzialità delle colture legnose da biomassa a destinazione energetica negli ambienti mediterranei. Il caso di studio della SRC di pioppo*	E. Bonari (Sant'Anna School)
GIUNTI, Giulia	2016	*Pre- and post-imaginal associative learning for host-borne cues from different trophic contexts in the parasitic wasp* Psyttalia concolor *(Szépligeti) (Hymenoptera: Braconidae)*	A. Canale
LABAGNARA, Tilde	2014	*Wine yeast biodiversity during spontaneous fermentation in response to environmental stress*	A. Toffanin
LANDI, Marco	2014	*Can anthocyanins photoprotect purple genotypes of* Ocimum basilicum *L. against boron toxicity and high light?*	L. Guidi
MASCAGNI, Flavia	2016	*Structural genomics of sunflower (*Helianthus annuus *L.)*	L. Natali
MATTEUCCI, Marco	2014	*Monitoring CO2 fluxes and partitioning of soil respiration in a Mediterranean forest ecosystem: an integrated approach to carbon cycle*	G. Lorenzini

ORLANDI, Cecilia	2014	*Influenza del ristagno idrico sulla produzione dei cereali autunno-vernini*	A. Masoni
PEPE, Alessandra	2017	*Biofortification of food plants by mycorrhizal symbionts: investigations on the role of mycelial networks.*	M. Giovannetti
SCATTINO, Claudia	2014	*A biochemical and molecular dissection of the response induced by postharvest UV-B radiation on quality traits of peach fruits*	A. Ranieri, P. Tonutti (Sant'Anna School)
SULCA VILLAMARÌN, Tania Salomé	2017	*Application of jasmonates to improve the production of secondary metabolites in plants of agricultural interest, grown in vitro and in vivo*	P. Vernieri

Publications

From 2014 to 2017, PhD students at DAFE have published about 200 articles, including research or review papers in peer-reviewed journals or in conference proceedings. A selection of publications closely related to the subject of the dissertation of each candidate is reported below.

Galli F., **Arcuri** S., Bartolini F., Vervoort J., Brunori G. (2017). Exploring scenario guided pathways for food assistance in Tuscany. *Bio-based and Applied Economics* 5: 237-266.

Copetti D., Zhang J., El Baidouri M., Gao D., Wang J., **Barghini E.**, **Cossu R.M.**, Angelova A., Maldonado L., Roffler S., Ohyanagi H., Wicker T., et al. (2015). RiTE database: a resource database for genus-wide rice genomics and evolutionary biology. *BMC Genomics* 16:538.

Natali L., Cossu R.M., **Barghini E.,** Giordani T., Buti M., **Mascagni F.**, Morgante M., Gill N., Kane N.C., Rieseberg L., Cavallini A. (2014). The repetitive component of the sunflower genome as shown by different procedures for assembling next generation sequencing reads. *BMC Genomics* 14: 686-699.

Barghini E., Natali L., Giordani T., **Cossu R.M.**, Scalabrin S., Cattonaro F., Šimková H., Vrána J., Doležel J., Morgante M., Cavallini A. (2015). LTR retrotransposon dynamics in the evolution of the olive (*Olea europaea*) genome. *DNA Research* 22: 91–100.

Agnolucci M., **Battini F.**, Cristani C., Giovannetti M. (2015). Diverse bacterial communities are recruited on spores of different arbuscular mycorrhizal fungal isolates. *Biology and Fertility of Soils* 51: 379–389.

Buccioni A., **Cappucci A.**, Mele M. (2015). Methane Emission from Enteric Fermentation: Methanogenesis and Fermentation. In: S. Veerasamy, J. Gaughan, L. Baumgard, C. Prasad (Eds) *Climate Change Impact on Livestock: Adaptation and Mitigation*, pp.171-186.

Catola S.,Ganesha S.D.K., Calamai L., Loreto F., Ranieri A., Centritto M. (2016). Headspace-solid phase microextraction approach for dimethylsulfoniopropionate quantification in *Solanum lycopersicum* plants subjected to water stress. *Frontiers in Plant Science* 7: 1257.

Caturegli L., Casucci M., Lulli F., Grossi N., Gaetani M., Magni S., Bonari E., Volterrani M. (2015). GeoEye-1 satellite versus groundbased multispectral data for estimating nitrogen status of turfgrasses. *International Journal of Remote Sensing* 36: 2238-2251.

Caturegli L., Corniglia M., Gaetani M., Grossi N., Magni S., Migliazzi M, et al. (2016). Unmanned aerial vehicle to estimate nitrogen status of turfgrasses. PLoS ONE 11: e0158268.

Wang M., Yu, Y., Haberer G., Marri P.R., Fan C., Goicoechea J.L., Zuccolo A., Song X., Kudrna D., Ammiraju J.S.S., **Cossu R.M.**, et al. (2014). The genome sequence of African rice (*Oryza glaberrima*) and evidence for independent domestication. *Nature Genetics* 46.

Cotrozzi L., Remorini D., Pellegrini E., **Landi** M., Massai R., Nali C., Guidi L., Lorenzini G. (2016). Variations in physiological and biochemical traits of oak seedlings grown under drought and ozone stress. *Physiologia Plantarum* 157: 69-84.

Guidi L., Remorini D., **Cotrozzi** L., Giordani T., Lorenzini, G., Massai R., Nali C., Natali L., Pellegrini E., Trivellini A., Vangelisti A., Vernieri P., **Landi** M. (2017). The harsh life of an urban tree: the effect of a single pulse of ozone in salt-stressed *Quercus ilex* saplings. *Tree Physiology* 37: 246-260.

D'Angiolillo F., Pistelli L., Noccioli C., Ruffoni B., Piaggi S., Scarpato R., Pistelli L. (2014). In vitro cultures of *Bituminaria bituminosa*: pterocarpan, furanocoumarinand isoflavone production and cytotoxic activity evaluation. *Natural Product Communications* 9: 477-480.

Bartolini F., Angelini L.G., Brunori G., **Gava O.** (2015). Impacts of the CAP 2014-2020 on the agro-energy sector in Tuscany, Italy. *Energies* 8: 1058-1079.

Galli F., Bartolini F., Brunori G., Colombo L., **Gava O.**, Grando S., Marescotti A. (2015). Sustainability assessment of food supply chains: an application to local and global bread in Italy. *Agricultural and Food Economics* 3: 21.

Cirilli M., Caruso G., **Gennai C.**, Urbani S., Frioni E., Ruzzi M., Servili M., Gucci R., Poerio E., Muleo R. (2017). The role of polyphenoloxidase, peroxidase, and β-glucosidase in phenolics accumulation in *Olea europaea* L. fruits under different water regimes. *Frontiers in Plant Science* 8: 717.

Turrini A., Caruso G., Avio L., **Gennai C.**, **Palla M.**, Agnolucci M., Tomei P.E., Giovannetti M., Gucci R. (2017). Protective green cover enhances soil respiration and native mycorrhizal potential compared with soil tillage in a high-density olive orchard in a long term study. *Applied Soil Ecology* 116: 70-78.

Giunti G., Canale A., Messing R.H., Donati E., Stefanini C., Michaud J.P., Benelli G. (2015). Parasitoid learning: current knowledge and implications for biological control. *Biological Control* 90: 208–219.

Giunti G., Benelli G., Flamini G., Michaud J.P., Canale A. (2016). Innate and learned responses of the tephritid parasitoid *Psyttalia concolor* (*Hymenoptera*: *Braconidae*) to olive volatiles induced by *Bactrocera oleae* (*Diptera*: *Tephritidae*) infestation. *J. Economic Entomol.* 109: 2272–2280.

Pardossi A., Romani M., Carmassi G., Guidi L., **Landi M.**, Incrocci L., Maggini R., **Puccinelli M.**, Vacca W., Ziliani M. (2015). Boron accumulation and tolerance in sweet basil (*Ocimum basilicum* L.) with green or purple leaves. *Plant and Soil* 395: 375-389.

Penella C., **Landi M.**, Guidi L., Nebauer S.G., Pellegrini E., San Bautista A., Remorini D., Nali C., López-Galarza S., Calatayud A. (2016). Salt-tolerant rootstock increases yield of pepper under salinity through maintenance of photosynthetic performance and sinks strength. *Journal of Plant Physiology* 193: 1-11.

Martini A., Tavarini S., Macchia M., Benelli G., Canale A., Romano D., Angelini L. G. (2016). Influence of insect pollinators and harvesting time on the quality of *Stevia rebaudiana* (Bert.) Bertoni seeds. *Plant Biosystems* 151: 341-351.

Benelli G., Canale A., Romano D., Flamini G., Tavarini S., **Martini A.**, Ascrizzi R., Conte G., Mele M., Angelini, L. G. (2017). Flower scent bouquet variation and bee pollinator visits in *Stevia rebaudiana* Bertoni (*Asteraceae*), a source of natural sweeteners. *Arthropod-Plant Interactions* 11: 381-388.

Mascagni F., **Barghini E.**, Giordani T., Rieseberg L.H., Cavallini A., Natali L. (2015). Repetitive DNA and plant domestication: variation in copy number and proximity to genes of LTR-retrotransposons among wild and cultivated sunflower (*Helianthus annuus*) genotypes. *Genome Biology & Evolution* 7: 3368-3382.

Moles T.M., Pompeiano A., Huarancca Reyes T., Scartazza A., Guglielminetti L. (2016). The efficient physiological strategy of a tomato landrace in response to short-term salinity stress. *Plant Physiology and Biochemistry* 109: 262-272.

Arduini I., **Orlandi C.,** Pampana S., Masoni A. (2016). Waterlogging at tillering affects spike and spikelet formation in wheat. *Crop and Pasture Science* 67: 703-711.

Arduini I., **Orlandi C.,** Ercoli L., Masoni A. (2016). Submergence sensitivity of durum wheat, bread wheat and barley at the germination stage. *Italian Journal of Agronomy* 11: 100-106.

Palla M., Cristani C., Giovannetti M., Agnolucci M. (2017). Identification and characterization of lactic acid bacteria and yeasts of PDO Tuscan bread sourdough by culture dependent and independent methods. *International Journal of Food Microbiology* 250: 19–26.

Pepe A., Giovannetti M., Sbrana C. (2016). Different levels of hyphal self-incompatibility modulate interconnectedness of mycorrhizal networks in three arbuscular mycorrhizal fungi within the Glomeraceae. *Mycorrhiza* 26: 325–332.

Peruzzi A., Martelloni L., Frasconi C., Fontanelli M., **Pirchio M.**, Raffaelli M. (2017). Machines for non-chemical intra-row weed control in narrow and wide-row crops: a review. *Journal of Agricultural Engineering* 48: 57-70.

Grossi N., Fontanelli M., Garramone E., Peruzzi A., Raffaelli M., **Pirchio M.**, Martelloni L., Frasconi C., **Caturegli L.**, Gaetani M., Magni S., McElroy J.S., Volterrani M. (2016). Autonomous mower saves energy and improves quality of tall fescue lawn. *HortTechnology* 26: 825-830.

Puccinelli M., Malorgio F., Pezzarossa B. (2017). Selenium enrichment of horticultural crops. *Molecules* 22: 933.

Scattino C., Castagna A., Neugart S., Chan H.M., Schreiner M., Crisosto C.H., Tonutti P., Ranieri A. (2014). Post-harvest UV-B irradiation induces changes of phenol contents and corresponding biosynthetic gene expression in peaches and nectarines. *Food Chemistry* 163: 51-60.

Scattino C.,Negrini N., Morgutti S., Cocucci M., Crisosto C.H., Tonutti P., Castagna A., Ranieri A. (2016). Cell wall metabolism of peaches and nectarines treated with UV-B radiation: A biochemical and molecular approach. *Journal of the Science of Food and Agriculture* 96: 939-947.

Trivellini A., Lucchesini M., Maggini R., Mosadegh H., **Sulca Villamarin T.**, Vernieri P., Mensuali A., Pardossi A. (2016). Lamiaceae phenols as multifaceted compounds: bioactivity, industrial prospects and role of "positive-stress". *Industrial Crops and Products* 83: 241–254.

Vanni G., Cardelli R., Marchini F., Saviozzi A., Guidi L. (2015). Are the physiological and biochemical characteristics in dandelion plants growing in an urban area (Pisa, Italy) indicative of soil pollution? *Water Air Soil Pollution* 226: 124-139.

Venturi F., Sanmartin C., Taglieri I., **Xiaoguo Y.**, Andrich G., Zinnai A. (2017). A kinetic approach to describe the time evolution of red wine as a function of packaging and storage conditions. *Acta Alimentaria* 46, online first.

Xiaoguo Y., Zinnai A., Venturi F., Sanmartin C., Deng S. (2017). Freshness evaluation of grass carp (*Ctenopharyngodon idellus*) by electronic nose. (2017) *Journal of Food Measurement and Characterization*, online first.

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Applications

Candidates are required to have a Master's degree and have to demonstrate good knowledge of the research themes reported above.

The number of graduates students admitted to each program varies from year to year depending on the number of grants available and the results of the selection process. For instance, eleven candidates will be admitted in 2017 (XXXIII cycle, 2017-2020). Nine scholarships will be available, including two reserved for candidates who have achieved their MSc degree abroad.

A grant consists of a stipend of approx. € 13,600 per year (including social security contribution) for the whole duration of the PhD programme (3 years maximum). The grant is increased by 50% if the student does an internship (at least 15 days) abroad in a foreign academic or research institution. After the first year, each candidate receives an annual research contribution of approximately € 1,600.

The selection of PhD candidates is based on their educational (f.i., average exam grade, final numerical grade for the entire degree, honour etc.) and scientific (publications, positions as young scientist, stage abroad etc.) curriculum and on an interview (either on site or via web conference) conducted in the research areas that every year the Board proposes to the new candidates.

The admission call is open in June-July and the selection takes place in September. The candidates should check the website (http://dottorato.unipi.it/index.php/en/) regularly for additional information on deadlines for applications, proposed research subjects, selection criteria, date(s) of interview, number of scholarships and positions without scholarship, and university fee.

Candidates may also be admitted, at any time, under the supernumerary category if:

- they hold a grant or a similar form of funding which is part of a project promoted by the European Union and/or other European or international organizations;
- they are non-EU citizens who do not reside in Italy and hold a grant or have some form of economic support from their country of origin.

Supernumerary PhD candidates may be required to pay an annual departmental fee (bench fee), which depends on the type of research work and will be determined by the DAFE. For further information on the admission of supernumerary students, the candidates should look at http://dottorato.unipi.it/index.php/en/ and/or contact the Coordinator (*andrea.cavallini@unipi.it*).

Living in Pisa

The cost of living in Pisa is approximately € 600-700 per month; for instance, the rental for student accommodation ranges between € 300 and € 400 per month.

Free registration to the Italian National Health Service (SSN) guarantees medical care for all Italian students. Health care assistance is also available to all European citizens (belonging to EU Member States and EEA States) who have the EHIC/TEAM card (European Health Insurance Card) or who enrol in the SSN. For non-EU foreign citizens (who belong to countries which are outside the European Union and of the European Economic Area), the insurance coverage for health services or hospitalization is required to obtain an entry visa in Italy and then later the residence permit.

Further information can be found in the International Student's Guide of the University of Pisa (http://www.unipi.it/media/k2/attachments/GuidaStudInt2014_ENG_1.pdf)

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