

[Studenti online](#)[Servizi online](#)[Biblioteca](#)[Shop online](#)[Intranet](#)[Login ➔](#)[IT](#) [EN](#)[Cerca](#)[▼ Ateneo](#)[▼ Formazione](#)[▼ Ricerca](#)[▼ Terza Missione](#)[▼ Internazionale](#)[▼ Info per](#)[Entrare al Sant'Anna](#)

PROFESSORE ORDINARIO

Istituto di Scienze delle Piante

Pierdomenico Perata



pierdomenico.perata@santannapisa.it (mailto:pierdomenico.perata@santannapisa.it)



050 881901 (tel:+39050 881901)



Plantlab (<http://www.plantlab.sssup.it>) - ResearcherID Profile
(<http://www.researcherid.com/rid/A-5658-2008>)

Biografia/curriculum (#bio)

Ricerca (#ricerca)

Pubblicazioni (#pubblicazioni)

Bio

Pierdomenico Perata si laurea in Scienze Agrarie presso l'Università di Pisa nel 1985 e nello stesso anno consegue il Diploma di Licenza della Scuola Superiore Sant'Anna, dove ottiene anche il diploma di perfezionamento in Scienze Agrarie nel 1987. Nel 1990 conclude il dottorato di Ricerca in Biologia Agraria presso l'Università di Pisa.

Corsi e  (#lezioni)
conferenze

News  (#news)

Dal 1991 al 1999 è stato Ricercatore universitario di Fisiologia Vegetale presso l'Università di Pisa, mentre dal 1999 al 2000 ha rivestito la carica di Professore Associato di Fisiologia Vegetale alla Facoltà di Scienze MFN dell'Università di Bari. Per l'Università di Modena e Reggio Emilia è stato Professore Ordinario di Fisiologia Vegetale alla Facoltà di Scienze Agrarie dal 2000 al 2004, rivestendo anche la carica di Vice Preside nell'anno 2003-2004.

Per la Scuola Superiore Sant'Anna Pierdomenico Perata ha rivestito le seguenti cariche:

- dal 2004 Professore Ordinario di Fisiologia Vegetale;
- dal 2011 al 2013 Coordinatore del Dottorato Internazionale in Agrobiodiversità;
- da dicembre 2010 a maggio 2013 Preside della Classe di Scienze Sperimentali;
- da gennaio 2012 a maggio 2013 Prorettore vicario.

Dall'8 maggio 2013 è Rettore della Scuola Superiore Sant'Anna.

Scadenza del mandato di Rettore: maggio 2019.

ALTRI INCARICHI

Nel 1987 è Ricercatore ospite presso il Centro di ricerche SCLAVO spa (Siena); dal 1991 al 1992 è JSPS post-doctoral fellow presso la Nagoya University, in Giappone, per la quale ha rivestito anche l'incarico di Visiting Scientist dal 1996 al 1997.

RICONOSCIMENTI

Nel 1994 Pierdomenico Perata ha ricevuto il prestigioso premio FESPP Award (Awarded by the Federation of European Societies of Plant Physiology at its biannual FESPB Congress

to two young scientists under the age of 35, for excellence in their scientific achievements). Dal 2009 è socio dell'Accademia Nazionale delle Scienze detta dei XL; inoltre è membro dell'Accademia dei Georgofili dal 2008.

ATTIVITÀ SCIENTIFICHE

L'attività di ricerca di Pierdomenico Perata è svolta nell'ambito della Fisiologia delle Piante, con un approccio prevalente di biologia molecolare. I temi di studio sono la fisiologia degli stress, la interazione tra metabolismo primario e fisiologia ormonale, la sintesi di pigmenti di interesse nutraceutico.

Nel corso della sua carriera di ricercatore ha ipotizzato e dimostrato sperimentalmente come il metabolismo dell'amido rappresenti uno snodo metabolico essenziale per la tolleranza delle piante alla ipossia. Negli ultimi anni le sue ricerche si sono fortemente orientate allo studio della fisiologia molecolare dell'ipossia nelle piante, con la recente scoperta del sensore dell'ossigeno nelle piante.

Ricerca

Plant responses to anaerobiosis



Plant life is greatly impaired under conditions of oxygen deficit. Only few plants can grow in waterlogged soils, thanks to anatomical adaptation allowing the transport of oxygen to the submerged parts of the plant. The behaviour of a few plant species able to germinate under completely anoxic

conditions can be explained only by assuming that a biochemical adaptation is present in these species but absent in all the other species. Research on this subject has produced experimental evidence about the key role of carbohydrate mobilisation during anaerobic germination of rice grains, about the role of ethanol in anoxia-induced injuries, and more recently, about the genome-wide transcript profiling in anoxic *Arabidopsis* seedlings.

Signal transduction in plants: hormone and sugar sensing



The ability to sense sugars is crucial for the modulation of gene expression in plants. Despite the importance of this phenomenon, our knowledge of sugar sensing in plants is scant. Several valuable hypotheses have been put forward based on the extensive knowledge of sugar sensing in yeast. In recent years, tests of these hypotheses have shown that hexokinase and sucrose-non-fermenting- (SNF-) related proteins appear to be involved in sugar sensing and transduction, not only in yeast but also in higher plants. However, even if plants share with yeast some elements involved in sugar sensing, several aspects of sugar perception are likely to be peculiar to higher plants. Plants should be able to sense not only glucose but also other hexoses, Such as fructose and disaccharides (sucrose, maltose and others). We have shown that comparing the molecular requirements for sucrose transport with those for disaccharide sensing suggests that these sugars are perceived possibly at the plasma membrane level independently from sucrose transport. Evidence is provided of cross-talk between the sugar-sensing pathways and the physiology of plant hormones.

Crop physiology: source-sink relations in sugar beet



Sugar-beet plants accumulate sucrose in the root. This plant is of special interest for plant physiologists studying the physiology and biochemistry of plant carbohydrates. Sugar-beets should ideally display a flux of sucrose

from the leaf system to the root. This is not always what is observed, and under particular growing conditions some sucrose stored in the root can be lost due to a backflow from the root to the leaves. This phenomena has negative economical consequences for the sugar-beet grower. We use molecular probes and enzymatic tests as markers of the source-sink status of the plant tissues, with the aim of elucidating the pathways of sucrose metabolism in open-fields grown sugar-beet plants.

Phytoremediation of heavy-metal contaminated soils



Phytoremediation of contaminated soils is a hot topic, since plants are a robust and renewable resource. Hyperaccumulation of metals or metalloids seems to be essential for phytoextraction, and vacuolar sequestration is a key component conferring hypertolerance. Natural hyperaccumulators as model plants can be studied in order to enhance heavy metal accumulation and/or tolerance. Recent studies demonstrated that both good biomass yields and metal hyperaccumulation are required to make this process efficient, but accumulation of metals to high levels in plant species is often hampered by low biomass. Genetic engineering can help to overcome these limits, but more knowledge of the molecular mechanisms that underlie this process is however required before the traits can be transferred to high biomass plants. The practical aspects of the use of hyperaccumulating plants need also further research. We examined the ability of *Cannabis sativa* to take up and tolerate Cu salts from a nutrient solution. By means of electron microscopy and X-ray microanalysis, we observed Cu accumulation in upper leaf epidermal cells, in spiculae and in abaxial trichomes. No traces of this metal was found in epidermal cells of the stem. Even if *Cannabis* seems not to have evolved a specific tolerance and accumulation mechanisms, it shows to have a considerable potential for phytoremediation purposes. It is able to transfer Cu from the root to the shoot, one of the criteria that must be met to

consider a plant well suited for phytoremediation. Moreover the fibres seem not to be affected by Cu contamination, allowing them to be collected and used with economical advantage.

Fortification of plant crops with iodine



Iodine deficiency is common throughout the less developed world, resulting in cretinism, goitre, immune incompetence and learning disabilities. Food supplements (e.g. iodized salts) are effective in some parts of the world, but fail in less developed countries because of infrastructure problems. Field fortification is therefore considered desirable. However, iodine leaches readily from soils and its content in most soils is generally low. Plants take up iodine, but crop species show variable efficiency in this ability. For example *Brassica napus* shows a good ability to take up iodine, while *Lycopersicon esculentum* and *Oryza sativa* can take up iodine with lower efficiency. Iodization of irrigation water have been shown to contribute to reducing iodine deficiency disorders. The aim of the project is to provide new technologies to increase the iodine content in plants. This goal will be achieved through an integrated approach including the study of iodine uptake in plants, the development of a protocol for the treatment of crop plants with iodine applied as a leaf spray, and the production of transgenic plants overexpressing the human sodium iodide symporter. Preliminary experimental evidence suggests that potato plants treated with iodine salt can increase significantly their iodine content in the tubers. (Download the paper "in Italian- "Lo iodio nell'alimentazione umana ed il ruolo delle colture erbacee").

High-anthocyanin tomatoes

Tomato (*Solanum lycopersicon* L.) is cultivated all over the world as annual crop (for few months up to nearly the whole year) in open field and under greenhouse conditions for



both fresh consumption and industrial processing (canned products, fruit juice, etc.). The nutraceutical properties of tomato are mainly related to the antioxidant potential of tomato, which in turn is due to the presence of a mix of antioxidant bio-molecules like lycopene, ascorbic acid, phenolics, flavonoids and vitamin E. On the other hand, tomato fruits do not normally contain significant concentration of anthocyanins, substances with a well known nutraceutical value.

The aim of this research project is the production of high-anthocyanin containing tomatoes.

In order to achieve this goal, the project will take advantage of the joint efforts of researchers well qualified in horticulture, crop physiology, genetics and breeding.

More in detail, these are the objectives of the project:

- to investigate the influence of growing conditions, including cultivation season and the salinity of irrigation water, on the accumulation of anthocyanins and other pigments in the fruits of selected genotypes of *Solanum lycopersicon*.
- the description of the physiology of anthocyanin synthesis in tomato, including the identification of regulatory genes as well as genes encoding for the enzymes involved in the anthocyanin biosynthetic pathways. Furthermore, the effects of sugars and of plant hormones will also be investigated. This information will be used as tools in breeding as well as for establishing optimal growth conditions to enhance anthocyanin synthesis in tomato.
- the creation of tomato breeding lines which possess a high anthocyanin content in the plant as well as in the fruit, by combining monomendelian mutants differing in the anthocyanin content of the plant and the fruit.

- the identification of suitable molecular markers to support the breeding activities.
 - the identification of the role of anthocyanins in the response to biotic (*Xanthomonas campestris* pv *vesicatoria*; *Alternaria*) and abiotic (chilling, salinity) stress.
-

Pubblicazioni

- Gómez-Álvarez, Eva Maria; Marazzini, Margherita; Caproni, Leonardo; Magnani, Luca; Cardarelli, F; Dell'Acqua, Matteo; Perata, Pierdomenico; Pucciariello, Chiara
Rainfall patterns during barley seed development underlie genomic variation for germination after flooding → (<https://www.iris.sssup.it/handle/11382/583312>)
(2025)
- Triozzi, Paolo M.; Brunello, Luca; Novi, Giacomo; Ferri, Gianmarco; Cardarelli, Francesco; Loreti, Elena; Perales, Mariano; Perata, Pierdomenico
Spatiotemporal oxygen dynamics in young leaves reveal cyclic hypoxia in plants → (<https://www.iris.sssup.it/handle/11382/564172>)
(2024)
- Menconi, J.; Perata, P.; Gonzali, S.
In pursuit of purple: anthocyanin biosynthesis in fruits of the tomato clade → (<https://www.iris.sssup.it/handle/11382/566394>)
(2024)

- Castellana, Simone; Triozzi, Paolo Maria; Dell'Acqua, Matteo; Loreti, Elena; Perata, Pierdomenico
Environmental genome-wide association studies across precipitation regimes reveal that the E3 ubiquitin ligase MBR1 regulates plant adaptation to rainy environments → (<https://www.iris.sssup.it/handle/11382/571292>)
(2024)
- Brunello, L.; Polverini, E.; Lauria, G.; Landi, M.; Guidi, L.; Loreti, E.; Perata, P.
Root photosynthesis prevents hypoxia in the epiphytic orchid Phalaenopsis → (<https://www.iris.sssup.it/handle/11382/566393>)
(2024)
- Fagerstedt, K V; Pucciariello, C; Pedersen, O; Perata, P
Recent progress in understanding the cellular and genetic basis of plant responses to low oxygen hold promise for developing flood-resilient crops → (<https://www.iris.sssup.it/handle/11382/561092>)
(2024)
- Brunello, Luca; Kunkowska, Alicja B; Olmi, Emma; Triozzi, Paolo M; Castellana, Simone; Perata, Pierdomenico; Loreti, Elena
The transcription factor ORA59 represses hypoxia responses during Botrytis cinerea infection and reoxygenation → (<https://www.iris.sssup.it/handle/11382/575232>)
(2024)
- Pucciariello, Chiara; Perata, Pierdomenico
Plant Quiescence Strategy and Seed Dormancy under Hypoxia → (<https://www.iris.sssup.it/handle/11382/565492>)
(2024)

- Gómez-Álvarez, Eva María; Salardi-Jost, Monique; Ahumada, Germán Darío; Perata, Pierdomenico; Dell'Acqua, Matteo; Pucciariello, Chiara

Seed bacterial microbiota in post-submergence tolerant and sensitive barley genotypes → (<https://www.iris.sssup.it/handle/11382/562492>)

(2024)

- Rovere, Martina; Pucciariello, Chiara; Castella, Claude; Berger, Antoine; Forgia, Marco; Guyet, Tran A; Bosseno, Marc; Pacoud, Marie; Brouquisse, Renaud; Perata, Pierdomenico; Boscari, Alexandre

Group VII ethylene response factors, MtERF74 and MtERF75, sustain nitrogen fixation in *Medicago truncatula* microoxic nodules →

(<https://www.iris.sssup.it/handle/11382/551431>)

(2023)

[Load More\(?page=1\)](#)

Corsi

Scuola Estiva di Orientamento Volterra 2008

[Sfida intellettuale \(/sites/default/files/UploadDocs/sfidaintellettuale.ppt\)](/sites/default/files/UploadDocs/sfidaintellettuale.ppt) (file ppt, 100 kb)

[Sfida intellettuale \(/sites/default/files/u39/2_sssup_document_file84718.pdf\)](/sites/default/files/u39/2_sssup_document_file84718.pdf) (file pdf, 3,4 Mb)

Corso di Biotecnologie Vegetali

Master universitario di primo livello in valorizzazione e controllo delle produzioni agro alimentari

[Introduzione alle biotecnologie 1 \(/sites/default/files/u39/1_sssup_document_file724892.pdf\)](/sites/default/files/u39/1_sssup_document_file724892.pdf) (file ppt, 284 kb)

[Introduzione alle biotecnologie 2 \(/sites/default/files/u39/2_sssup_document_file72491.pdf\)](/sites/default/files/u39/2_sssup_document_file72491.pdf) (file pdf, 696 kb)

[Biotecnologie applicate alla difesa da insetti](#)

[\(/sites/default/files/u39/3_sssup_document_file72493.pdf\)](/sites/default/files/u39/3_sssup_document_file72493.pdf) (file pdf, 1.535 kb)

[Biotecnologie applicate alla difesa da virus \(/sites/default/files/u39/4_sssup_document_file72502.pdf\)](/sites/default/files/u39/4_sssup_document_file72502.pdf) (file pdf, 989 kb)

[Biotecnologie applicate alla floricoltura \(/sites/default/files/u39/5_sssup_document_file72495.pdf\)](/sites/default/files/u39/5_sssup_document_file72495.pdf) (file pdf, 275 kb)

[Biotecnologie applicate alla maturazione dei frutti](#)

[\(/sites/default/files/u39/6_sssup_document_file72497.pdf\)](/sites/default/files/u39/6_sssup_document_file72497.pdf) (file pdf, 679 kb)

[Biotecnologie applicate al diserbo \(/sites/default/files/u39/7_sssup_document_file72503.pdf\)](/sites/default/files/u39/7_sssup_document_file72503.pdf) (file pdf, 1.440 kb)

[Biotecnologie applicate alla nutrizione e bioindustriali](#)

[\(/sites/default/files/u39/8_sssup_document_file72500.pdf\)](/sites/default/files/u39/8_sssup_document_file72500.pdf) (file pdf, 644 kb)

Crop Physiology

International Doctoral Scholarships in Agrobiodiversity

[Crop Physiology: Sugarbeet \(/sites/default/files/u39/1_sssup_document_file72595.pdf\)](/sites/default/files/u39/1_sssup_document_file72595.pdf) (file ppt, 456 kb)

[Crop Physiology Sugarbeet \(/sites/default/files/u39/2_sssup_document_file73083.ppt\)](/sites/default/files/u39/2_sssup_document_file73083.ppt) flowering (file pdf, 4.028 kb)

Crop Physiology Phytoremediation (/sites/default/files/u39/3_sssup_document_file73333.pdf) (file pdf, 3.892 kb)

Crop Physiology Iodine (/sites/default/files/u39/4_sssup_document_file73085.pdf) (file pdf, 1.246 kb)

Corso Fisiologia Vegetale Applicata

Fisiologia Post Raccolta (/sites/default/files/u39/4_sssup_document_file73085_0.pdf) (file ppt, 4.091 kb)

Corso "How to Publish in International Science Journals"

How to publish in International Science Journals

(/sites/default/files/u39/sssup_document_file76578.pdf) (file ppt, 4.446 kb)

News

- Articolo sulla "Genomica e Post-genomica delle Piante" su rivista DARWIN" (Download file (/sites/default/files/u39/darwin.pdf))
- Articolo su "Sun black" sul quotidiano Il Tirreno (Download file (/sites/default/files/u39/pomodoro_nero.pdf))
- Fotografie del pomodoro "Sun Black" (foto: 1 (/sites/default/files/u39/sun_black_serra.jpg), 2 (/sites/default/files/u39/sun_black_3_frutti.jpg), 3 (/sites/default/files/u39/frutti_tagliati.jpg), 4 (/sites/default/files/u39/sun_black_grappolo.jpg))
- Articolo sulla sintesi degli antociani in pomodoro (Rivista "Agronomica") (Download file (/sites/default/files/u39/agronomica_tom-anto.pdf))

- Servizio su "Sun black" di Studio Aperto ([video \(http://www.santannapisa.it/it/multimedia/studio-aperto-19-luglio-2008-sun-black\)](http://www.santannapisa.it/it/multimedia/studio-aperto-19-luglio-2008-sun-black))
- Servizio su "Sun black" del TG1 ([video \(http://www.santannapisa.it/it/multimedia/rai-uno-occhio-alla-spesa-pierdomenico-perata-sulle-variet%C3%A0-di-pomodoro\)](http://www.santannapisa.it/it/multimedia/rai-uno-occhio-alla-spesa-pierdomenico-perata-sulle-variet%C3%A0-di-pomodoro))
- Servizio su "Sun black" del TG3 ([video \(http://www.santannapisa.it/it/multimedia/rai-3-tgr-toscana-il-pomodoro-nero\)](http://www.santannapisa.it/it/multimedia/rai-3-tgr-toscana-il-pomodoro-nero))
- Servizio su "Sun black" di Uno Mattina ([video \(http://www.santannapisa.it/it/multimedia/rai-1-uno-mattina-pomodoro-nero\)](http://www.santannapisa.it/it/multimedia/rai-1-uno-mattina-pomodoro-nero))

Sostieni la Scuola
Sant'Anna Shop
Ufficio Stampa
Sant'Anna Magazine
Ufficio Relazioni con il pubblico (URP)

Come raggiungerci
Accessibilità
Amministrazione Trasparente
Concorsi, selezioni e gare
Privacy

Albo on line
Note Legali
Servizi online
Pagamenti on line (tramite PagoPA)
Partecipazione in enti esterni
Elezioni

seguici su



Piazza Martiri della Libertà, 33
56127 Pisa (Italia)
C.F. 93008800505
Tel. +39 050 883111
PEC
protocollo@sss sup.legalmailpa.it

© Scuola Superiore Sant'Anna 2025