

BIOGRAPHICAL SKETCH

NAME: Zoe Hilioti

POSITION TITLE: Principal Investigator

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Aristotle University, School of Agriculture, Thessaloniki, Greece	B. S.	1991	Plant Sciences
Mediterranean Agronomic Institute of Chania, Chania, Greece	M. Sc.	1993	Horticultural Sciences/Protected crops
The Pennsylvania State University, Dept. of Horticulture, State College, PA, USA	Ph.D.	1998	Horticulture/ Plant Molecular Biology

A. Personal Statement

I was attracted to the biological process of morphogenesis that takes place at different scales ranging from single cells to whole organism and captivated by the complexity of its regulation. The research in my laboratory is aimed at achieving an integrated and systems-level approach of the mechanisms by which extracellular and intracellular cues influence cell function and morphogenesis. Studies extend to assemblages of cells (fungal biofilms), structures and whole organisms (plants). We employ several techniques of molecular & cell biology, microscopy, biochemistry, genetics, genomics and computational biology to study the growth and development of eukaryotic organisms. We are particularly interested in the following research areas:

- Discovery and characterization of plant transcription factors
- Transcription regulation
- Targeted genome engineering with programmable endonucleases (ZFNs)
- Characterization of metabolic profiles of genome-engineered plants and plants that display natural genetic variation for selection of high value-added crops
- Study and Integration of residual biomass in form of biochar into crop production

Our present emphasis is on crop plants. The growing use of plants to produce food, fiber and biofuels represents a significant challenge for the agricultural sector in terms of breeding targets. To improve plants for food and energy in a climate smart way targeted horizontal technologies are used in the lab. Climate change and global warming have negative impact on plant growth and productivity due to drought and more drought-tolerant plants are needed to offset the consequences of climate change. Among vegetables, tomato is adapted to drought conditions and is suitable for production in most latitudes. Among non-edible oilseeds, castor bean is most

adapted to drought conditions with its deep root system while castor oil can be used in numerous valuable by-products including aviation fuels, high-grade lubricants, paints, protective coverings, printing inks, cosmetics and pharmaceuticals. The research links all levels of biological organization and evaluates metabolic and phenotypic changes as a result of genetic variation within the system. At another level, targeted genetic perturbation aims to create local genetic variation in a given genetic background to generate useful phenotypes for basic and applied research.

B. Positions and Honors

Pre and Postdoctoral positions and Professional experience:

9/2010: Principal Investigator, Systems biology lab, Institute of Applied Biosciences, Thessaloniki, Greece

3/2010-7/2010: Lecturer, 'General Microbiology', Technological Educational Institute of Eastern Macedonia and Thrace, School of Agricultural Technology, Department of Oenology and Beverage Technology, Drama, Greece

2004-6/2009: Assistant Research Scientist, with Dr. Andre Levchenko, Systems biology of MAPK signaling, Dept. of Biomedical Engineering, Johns Hopkins University, USA

2001-2004: Postdoctoral Research, with Dr. Kyle Cunningham, Systems biology of calcium/calcineurin signaling, Dept. of Biology, Johns Hopkins University, MD, USA

1999-2001: Postdoctoral Fellow, cell cycle regulation, with Dr. Orna Cohen-Fix, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, LMCB, MD, USA

25/7-14/8 2000: Teaching assistant, 'Yeast Genetics' Course, Cold Spring Harbor Laboratory, New York, NY, USA

1994-1998: Graduate Student, 'Post-pollination responses in *Pelargonium xhortorum*', Dr. Kathleen Brown, Dept. of Horticulture, the Pennsylvania State University, State College, PA, USA

1996-98: Teaching Assistant, Dept. of Horticulture, the Pennsylvania State University, State College, PA, USA.

Graduate courses: i) Post-harvest Physiology (with Prof. Kathleen Brown), ii) Experimental design (with Prof. Richard Craig), iii) Undergraduate course: Horticultural Systematics (with Prof. Richard Craig)

1991-1993: M.Sc. Fellow, 'Effect of long days and gibberellic acid application on four carnation (*Dianthus caryophyllus* L.) cultivars', Chania, Greece

6/1992: Lecturer, 'Design of parks and nurseries in the city of Chania', Chania, Greece

Awards, Honors, Grants

1991-1993: M.Sc. Fellow, Mediterranean Agronomic Institute of Chania, Chania, Greece

1994-97: Recipient of Advanced Research Scholarship in 'Floriculture', Greek State of Scholarship Foundation (I.K.Y), Athens, Greece

1995: Gerondelis Foundation Award for Excellence in Research, MA, USA

1996-98: Fellowship Award, The Pennsylvania State University, Dept. of Horticulture, State College, PA, USA

1996: "The Honor Society of Horticulture" Pi Alpha Xi, USA

1998: "The Women in Science and Engineering (WISE) award, USA

1999-2001: Visiting fellowship, National Institutes of Health, NIDDK, Bethesda, MD, USA

2008: Travel award for an oral presentation in 6th International Conference on Pathways, Networks, and Systems, Chania, Greece

2008: Travel award from Japanese government for an oral presentation in workshop "Systems Biology of MAPK pathways", Institute of Science and Technology, Okinawa, Japan

2011: Fellowship award for an oral presentation in EMBO/EMBL Symposium "Structure and Dynamics of Protein Networks", Heidelberg, Germany

2013: Travel grant for participation in 7th EPSO Conference 'Plants for a Greening Economy', Porto Heli, Greece

C. Contributions to Science (basic and applied science)

Signaling regulation and systems biology:

- a. Clark DG, Richards C, Hilioti Z, Lind-Iversen S and Brown K, 1997. Effect of pollination on accumulation of ACC synthase and ACC oxidase transcripts, ethylene production and flower petal abscission in geranium (*Pelargonium xhortorum* L.H Bailey). *Plant Molecular Biology* 34, pp. 855-865.
- b. Hilioti Z, Richards C and Brown KM, 2000. Regulation and role of pollination-induced ethylene on petal abscission in *Pelargonium xhortorum*. *Physiologia Plantarum* 109, pp. 322-332.
- c. Hilioti Z, Gallagher DA, Low-Nam ST, Ramaswamy P, Gajer P, Kingsbury TJ, Birchwood CJ, Levchenko A and Cunningham KW, 2004. GSK-3 kinases enhance calcineurin signaling by phosphorylation of RCNs. *Genes and Development* 18 (1), pp. 35-47.
- d. Paliwal S, Iglesias PA, Campbell KJ, Hilioti Z, Groisman A and Levchenko A, 2007. MAPK mediated transcriptional regulation leads to bimodal gene expression and adaptive gradient sensing in yeast pheromone pathway. *Nature* 446 (7131), pp. 46-51.

e. Hilioti Z, Sabbagh W Jr, Paliwal S, Bergmann A, Goncalves M, Bardwell L and Levchenko A, 2008. Oscillatory phosphorylation of yeast Fus3 MAPK kinase controls periodic gene expression and morphogenesis. *Current Biology* 18, pp. 1700-6.

Cell process regulation:

a. Hilioti Z, Chung YS, Moshizuki Y, Hardy CF and Cohen-Fix O, 2001. The anaphase inhibitor Pds1 binds to the APC/C-associated protein Cdc20 in a destruction box dependent manner. *Current Biology* 11(17), pp. 1347-1352.

b. Rajawat YS, Hilioti Z, Bossis I, 2011. Retinoic Acid induces autophagosome maturation through redistribution of the cation-independent mannose-6-phosphate receptor. *Antioxidants and Redox Signalling* 14, pp. 2165-2177.

c. Rajawat Y, Hilioti Z, Bossis I, 2010. Autophagy: A target for retinoic acids. *Autophagy* 6(8), pp. 1224-1226.

Development of technologies:

a. Pejawar-Gaddy S, Rajawat Y, Hilioti Z, Xue J, Gaddy DF, Finn OJ, Viscidi RP, Bossis I, 2010. Generation of a tumor vaccine candidate based on conjugation of a MUC1 peptide to polyionic papillomavirus virus-like particles. *Cancer Immunology, Immunotherapy*. 59, pp. 1685-1696.

b. Hilioti Z, Ganopoulos I, Ajith S, Bossis I, Tsaftaris A, 2016: A novel arrangement of zinc finger nuclease system for in vivo targeted genome engineering: the tomato LEC1-LIKE4 gene case. *Plant Cell Reports*: 1-15. DOI: 10.1007/s00299-016-2031-x. <http://rdcu.be/nlhu>

c. Hilioti Z, 2018: Non-transgenic Approach to Deliver ZFNs in Seeds for Targeted Genome Engineering. In: Liu J. (eds) *Zinc Finger Proteins. Methods Mol Biol*, vol 1867. Humana Press, New York, NY. doi: https://doi.org/10.1007/978-1-4939-8799-3_14. ISBN: 978-1-4939-8798-6

Characterization of high-order transcription regulators:

a. Hilioti Z, Ganopoulos I, Bossis I, Tsaftaris A, 2014. LEC1-LIKE paralog transcription factor: how to survive extinction and fit in NF-Y protein complex. *Gene* 543: 220-233.

b. Drosou V, Kapazoglou A, Koidou V, Merkouropoulos G, Hilioti Z, 2017: Spatial and temporal expression of cytosine-5 DNA methyltransferase and DNA demethylase gene families of the *Ricinus communis* during seed development and drought stress. *Plant Growth Regulation* 2017. DOI: 10.1007/s10725-10017-10323-y. <http://rdcu.be/vRRq>

c. Gago, C., Drosou, V., Paschalidis, K., Guerreiro, A., Miguel, G., Antunes, D., Hilioti, Z, 2017. Targeted gene disruption coupled with metabolic screen approach to uncover the *LEAFY COTYLEDON1-LIKE4 (L1L4)* function in tomato fruit metabolism. *Plant Cell Reports* 36: 1065-1082. DOI 10.1007/s00299-017-2137-9. <http://rdcu.be/qTif>

Breeding elite crops:

Merkouropoulos G, Kapazoglou A, Drosou V, Jacobs E, Krolzig A, Papadopoulou C, Hilioti Z, 2016. Dwarf hybrids of the bioenergy crop *Ricinus communis* suitable for mechanized

harvesting reveal differences in morpho-physiological characteristics and seed metabolic profiles. *Euphytica* 2016; 1-13. DOI 10.1007/s10681-016-1702-6.

Sustainable agriculture strategies:

Hilioti Z, Michailof CM, Valasiadis D, Iliopoulou EF, Koidou V, Lappas AA, 2017. Characterization of castor plant-derived biochars and their effects as soil amendments on seedlings. *Biomass and Bioenergy* 105, pp 96-106.

Advancement of a new field of study:

Michmizos D, Hilioti Z, 2018: A roadmap towards a functional paradigm for learning & memory in plants. *Journal of Plant Physiology* 2019;232:209. DOI 10.1016/j.jplph.2018.11.002

D. Additional Information

Reviewer: *Plant Molecular Biology Reporter*, *Planta*, *British Biotechnology Journal*, *BMC Genomics*, *Journal of Crop Science*, *Journal of Biotechnology Letters*, *International Journal of Vegetable Science*, *The Scientific Pages of Horticulture*, *Journal of Plant Biochemistry and Biotechnology*, *Plant Growth Regulation Journal*, *Emerging Topics in Life Sciences*, *Environmental Monitoring and Assessment*

2011: 'Applied Research & Innovation Competition' launched by Eurobank EFG and SEV Hellenic Federation of Enterprises

2013: Registry of Experts of the Special Management and Implementation Service in the areas of Research, Technological Development and Innovation as evaluator / certifier

2014: Member of the Evaluation Committee for the Czech/Norway research grants

Participation in research networks:

2012-2015: National representative of Greece in the Management Committee of COST FA1106: 'An integrated systems approach to determine the developmental mechanisms controlling fleshy fruit quality in tomato and grapevine'

2012: UBIOCHEM-III: 'Sustainable production of fuels/energy, materials and chemicals from biomass'

2012: DIBANET: 'Diesel miscible fuels from wastes, residues and non-food crops of Latin America & Europe'

Professional Memberships: Geotechnical Chamber of Greece (GEOTEE), Hellenic Society for Biological Sciences (EEBE)

Publicity related to Research:

<http://www.isaaa.org/kc/cropbiotechupdate/article/default.asp?ID=14806>

<https://us.makemefeed.com/2016/09/28/zinc-finger-nuclease-system-developed-for-targeted-genome-engineering-in-tomato-2676758.html>

<https://advanceseng.com/general-engineering/castor-plant-derived-biochars-effects-soil-amendments-seedlings/>

<https://sciencetrends.com/properties-of-biochar-derived-from-castor-plants/>

<https://www.lasciences.com/proprietes-du-biochar-derive-des-plantes-de-ricin>

<https://www.wissenature.com/eigenschaften-von-biokohle-abgeleitet-von-castor-plants>