

Manna Center program Summer Program 2022

Syllabus: Physiology and Pathology of Postharvest crops

Presented By Prof. Dov Prusky and Nir Ohad

The subject of Studies in Postharvest Physiology

1. Introduction to maintaining the quality of fresh produce after harvesting
2. Maturity indexes: from harvesting until consumption
3. Water loss and its effect on fruit quality and ripening – physiological and chemical aspects
4. Respiration and climacterics
5. Refrigeration, cooling methods, and the importance of cooling – principles and applications
6. Modified and controlled atmosphere - principles and applications
7. Waxing, packaging, and packing houses
8. Handling fresh produce after harvest – examples

The subject of Studies in Postharvest Pathology

1. Development of postharvest disease after harvest and the factors modulating their development.
2. Different approaches for disease resistance of fruits to postharvest diseases.
3. Mechanism of pathogen attack after harvest, microbiomes.
4. Mycotoxins and Secondary metabolites occurring in colonized fruits.
5. Physical factors affecting postharvest diseases.

6. Chemical factors affecting postharvest diseases, resistance to fungicides.
7. Biological control as a tool to prevent fungicide residues.

	Morning classes	Afternoon classes
1 st lecture	<p>Introduction to postharvest physiology: from harvest to consumption.</p> <p>PPTs</p> <ol style="list-style-type: none"> 1. Physiology of Postharvest losses 2. Physiology maturity indexes 3. Physiological effects of water losses 	<p>Postharvest Pathogens and postharvest losses.</p> <p>PPTs</p> <ol style="list-style-type: none"> 1. Introduction to Postharvest Pathology 2. Host modulation of the penetration of postharvest pathogens
2 nd lecture	<p>Fruit quality and ripening – physiological and chemical aspects</p> <p>PPTs.</p> <ol style="list-style-type: none"> 4. Physiology of Ripening 5. Physiology of Ripening and ethylene 	<p>Mechanism of penetration Mechanism of unripe fruit resistance</p> <ol style="list-style-type: none"> 3. Quiescent infection and its activation 4. Activation of fungal pathogenicity factors
3 rd lecture	<p>Respiration, climacterics, and refrigeration</p> <p>PPTs</p> <ol style="list-style-type: none"> 5. Physiology of maturation 6. Physiology and cooling systems 	<p>Mechanism of pathogen attack and microbiomes</p> <p>PPTs</p> <ol style="list-style-type: none"> 4. Activation of fungal pathogenicity factors 5. mycotoxins 6. Disease control, physical treatments
4 th lecture	<p>Cooling methods, controlled and modified atmosphere</p> <p>PPTs</p> <ol style="list-style-type: none"> 6. Physiology and cooling systems 7. Physiology of CA and MA 	<p>Disease control, hormonal and fungicide treatment</p> <p>PPTs</p> <ol style="list-style-type: none"> 6. Disease control, physical treatments 7. Disease control, prevention and induce resistance
5 th lecture	<p>Waxing, packaging, and packing houses</p> <p>PPTs</p> <ol style="list-style-type: none"> 8. Physiology of waxing and packaging 	<p>Fungicide application, disease resistance, and biological control,</p> <p>PPTs</p> <ol style="list-style-type: none"> 8. Disease control preventive treatment 9. Disease control, eradication, resistance, and biocontrol

Length of the course. - The course length will be 26 hours. They will be lectured during a 5-day week period, including 5.2 hours of lectures per day.

Mode of presentation. - The course will be presented as frontal lectures.

General objectives-

One of the key issues in promoting sustainable food security is to tackle the challenges of post-harvest. The course will include physiological and pathological aspects associated with the storage of fresh perishable agricultural produce. Studying the physiological and molecular level of ripening and aging processes occurring in fruit and vegetables. Learning the post-harvest decay causing pathogens, and the molecular basis of their pathogenic mechanism. Resistance of fresh produce to pathogens and its control mechanism. Induction of resistance by physical, chemical, and biological means.

Learning outcomes. - To understand the physiological and pathological aspects related to quality maintenance of harvested produce after prolonged storage and how to extend the storability and shelf life of the fresh produce.

Required Reading: Will be presented before the course lectures to students by mail.

Prerequisite- Introduction to plant biology.

Course evaluation: End year written examination

**Some of the possible related manuscripts that
will be discussed in the lectures**

1. Sara Posé, Candelas Paniagua, Antonio J. Matas, A. Patrick Gunning, Victor J. Morris, Miguel A. Quesada, José A. Mercado. 2019. A nanostructural view of the cell wall disassembly process during fruit ripening and postharvest storage by atomic force microscopy. Trends in Food Science and Technology
2. Greg Tucker, Xueren Yin, Aidi Zhang, MiaoMiao Wang, Qinggang Zhu, Xiaofen Liu, Xiulan Xie, Kunsong Chen and Don Grierson. 2017. Ethylene and fruit softening. Food Quality and Safety. 17
3. Bingxue Hu, Da-Wen Sun, Hongbin Pu, Qingyi Weic. 2019. Recent advances in detecting and regulating ethylene concentrations for shelf-life extension and maturity control of fruit: A review. Trends in Fruit Science and Technology 91.
4. Elazar Fallik and Zoran Ilic. 2019. Positive and Negative Effects of Heat Treatment on the Incidence of Physiological Disorders in Fresh Produce. Review
5. F. Bi, S. Barad, D. Ment, N. Luria, A. Dubey, V. Casado , N. Glam, J. D. Minguez, E. A. Espeso, R. Fluhr and D. Prusky.2016. Carbon regulation of environmental pH by secreted small molecules that modulate pathogenicity in phytopathogenic fungi. Molecular Plant Pathology, 2016
6. Rasclé C, Dieryckx C, Dupuy JW, Muszkieta L, Souibgui E, Droux M, Bruel C, Girard V, Poussereau N. The pH regulator PacC: a host-dependent virulence factor in *Botrytis cinerea*. Environ Microbiol Rep. 2018.