

Course Unit	Post-harvest technology	Field of study	Agricultural and animal production		
HPTC in	Agricultural Production	School	School of Agriculture		
Academic Year	2023/2024	Year of study	2	Level	0-2
Type	Semestral	Semester	1	ECTS credits	3.0
Workload (hours)	81	Contact hours	T -	TP -	PL -
			TC -	S -	E -
			OT 30	O -	
			Code 4069-577-2007-00-23		

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s) Luís Manuel Cunha Santos, Maria Fátima Alves Pinto Lopes da Silva

#### Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:

1. To know the technologies, processes and procedures used during and just after the harvesting, and the plants and equipments required;
2. To know the factors intervening on the harvesting timing; knowing how to use indicators and tools for their determination;
3. To know the plants and equipments for sorting, cleaning and storage of fruits and vegetables;
4. To know the standards and calibration equipments;
5. Cold and controlled atmosphere storage: to know how to choose the best temperature - relative humidity binomial and gas mixture combinations; to know how to avoid errors in the storage chambers;
6. To know the systems for modified atmosphere packaging;
7. To be able to identify and control the main pre- and post-harvest, biotic and abiotic factors, that affect the quality of fresh fruit and vegetables.

#### Prerequisites

Before the course unit the learner is expected to be able to:  
Not applicable.

#### Course contents

Harvesting fruits and vegetables. Harvesting timing. Transportation. Receipt. Sorting and cleaning. Calibration and standardization. Factors affecting postharvest fruit and vegetables quality. Plants and equipments for cold storage. Plants and equipments for controlled atmosphere storage. Monitoring and control of plants, equipments and products. Temperature - relative humidity binomials. gas mixture combinations in controlled atmosphere. Packaging and use of modified atmospheres.

#### Course contents (extended version)

1. Harvesting fruits and vegetables technology
  - Equipment
  - Operation conditions and performance
  - Harvesting timing
  - Mechanical harvesting costs
2. Transportation, reception, sorting and cleaning procedures
  - Equipment and performance
3. Calibration and standardization
4. Factors affecting postharvest quality
  - Quality attributes
  - Pre-harvest factors; ripening indicators and harvest date
  - Temperature, relative humidity, supplemental treatments applied to the commodity
5. Plants and equipments for cold storage. Compressors, evaporators, diffusers, isolation
6. Facilities and equipment for controlled atmosphere (CA)
  - Sealing of the chambers
  - Cold installation
  - Latest techniques (dynamic AC , AC with low ethylene CA in combination with 1-MCP)
7. Plants, equipments and products monitoring and control. Maintenance. Ethylene removal
  - Temperature - relative humidity binomials. Specification for each product
  - Sensors. Maintenance
  - Controlled atmosphere gas mixture combinations. Specification for each product/variety
8. Modified Atmosphere (MA)
  - Fundamentals
  - Effects of MA (favorable and adverse)
9. Facilities and equipment in a fruit and vegetable plant industry

#### Recommended reading

1. Pineda de las Infantas, M. T. S. , (2004) Procesos de Conservación Poscosecha de Produtos Vegetales. 1ª Ed. , A. Madrid Vicente, Ediciones. Madrid
2. Salunkhe, D. K. ; Kadam, S. S. (1998) Handbook of Vegetable Science and Technology - Production, Composition, Storage and Processing, Marcel Dekker, Inc.
3. Southgate, D. (1992) Conservación de frutas y hortalizas, 3ª ed. , Editorial Acirbia, S. A. , Zaragoza.
4. Ortiz-Cañavate (2003) Las Máquinas Agrícolas y su Aplicación Ediciones Mundi-Prensa, Madrid
5. Valero, D. (2010) Postharvest biology and technology for preserving fruit quality. Daniel Valero & Maria Serrano. CRC Press, Boca Raton. ISBN 978-1-4398-0266-3

#### Teaching and learning methods

Theoretical and practical lectures, covering: audiovisual resources and practical protocols performance. Study visits to fruit and vegetable post-harvest processing units.

#### Assessment methods

1. Ongoing evaluation - (Regular, Student Worker) (Final, Supplementary, Special)
  - Reports and Guides - 10% (Worksheets and reports on the theoretical-practical activities to be developed.)
  - Final Written Exam - 90% (Assessment of all theoretical and practical contents taught.)
2. Final evaluation - (Student Worker) (Final, Supplementary, Special)
  - Final Written Exam - 100% (Assessment of all theoretical and practical contents taught.)

## Language of instruction

Portuguese

## Electronic validation

Luís Manuel Cunha Santos, Maria Fátima Alves Pinto Lopes da Silva	Clementina Maria Moreira dos Santos	Luís Manuel Cunha Santos	José Carlos Batista Couto Barbosa
16-01-2024	18-01-2024	18-01-2024	19-01-2024