

SEC (2019)

AGRIBUSINESS

SEC 35

***SYLLABUS / LEARNING AND ASSESSMENT PROGRAMME***

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## Introduction

The aim of this learning and assessment programme is to assist secondary schools to manage vocational programmes, specifically in the planning and implementation of the programme delivery.

This learning and assessment programme is structured into two parts, namely

Part A: General Policies

Part B: Unit Specifications

In Part A, the overall aim and objectives of the programme are explained. Important terms that will be used in the LAP (Learning and Assessment Programme) will be defined. Additionally, policies, guidelines and strategies related to assessment practices are documented in this section. Quality Assurance processes and procedures are also documented in Part A of this document.

In Part B, the detailed specification of the three units that are to be implemented are provided for each unit. The learning outcomes, together with a brief description of the unit are also stipulated. The assessment criteria for each unit, together with assessment methods that are to be applied, are presented in this part of the document.

In order to ensure effective implementation of the programme, important standards and quality assurance processes and procedures have to be adopted. Standard templates will be provided in a separate document and will be structured as presented in the table provided overleaf.

Reference	Template
A	Assignment Brief Front Sheet
A	Record of Internal Verification – Assignment Brief
A	Record of Internal Verification – Assessment Decision
A	Unit Tracking Sheet Template
QA	Internal Verification Report Templates
QA	External Verification Report Templates

**Legend:**

**A:** Assessment

**QA:** Quality Assurance

## Part A: General Policies

### A.1. Programme Aim and Objectives

The aim of the vocational programme in Agribusiness is to provide learners with the underpinning knowledge related to Agribusiness. By the end of the programme, candidates are expected to have gained sufficient skills and should be able to apply knowledge and skills.

Upon completing this programme, learners should be able to:

1. Become familiar with the most common horticultural plants grown on the Maltese Islands.
2. Become familiar with the appropriate methods of soil sampling and analysis.
3. Develop the required skills to perform simple techniques in land cultivation, plant care and plant propagation
4. Be familiar with the health and safety regulations when using standard tools and equipment related to the Horticultural and animal husbandry sectors.
5. Promote best practices related to animal care whilst safeguarding both the animal and the carer.
6. Provide learners with the basics of rabbit care and breeding
7. Enable learners to develop an understanding of legal, ethical and sanitary regulations governing animal welfare in Malta.
8. Show the importance of pet rabbits and rabbit breeding for the society and economy.

## A.2. Definitions/ Terminology

Term	Definition
Assessor	The person responsible to grade the candidates' work, issue a mark and determine the candidates' final grade.
Assessment (Continuous)	A number of tasks given to the candidate during the course; these could be an individual task or as group work.
Controlled Assessment	An assessment in the form of an examination and conducted within a school environment. The minimum time for this assessment is 1 hour.
Learning Outcome	Learning Outcomes are statements, which describe what a qualification represents in terms of knowledge, skills and competences. The Malta Qualifications Framework (MQF) defines a learning outcome as what a learner understands and is capable of doing at the end of the learning process.
Knowledge	Knowledge refers to the understanding of basic, factual and theoretical information, which is traditionally associated with formal learning but can also be acquired from informal and non-formal learning.
Skills	Skills imply the application of acquired knowledge and understanding in different contexts. A skill may be the result of formal learning or of repetitive work in an informal setting.
Competences	Each competence is defined as a combination of knowledge and skills and is associated with the level of autonomy and responsibility that the person is expected to have at that level.
Unit Content	The unit content is the content required to be communicated and given to the candidate per learning outcome. Each learning outcome must have content related to it and this content must be delivered to give the candidates the tools to achieve that outcome.
Assessment Grading Criteria	A description of what a candidate is expected to do in order to demonstrate that a learning outcome has been achieved.
Sample of Work	A sample of work is a percentage of candidates' work gathered as a representative sample for the internal or external verifier.
Quality Assurance	To assure the standards and quality of the learning assessment programme.
Malta Qualification Framework	The Malta Qualifications Framework (MQF) provides an indication of the level of difficulty as a benchmark for a qualification, which needs to be assigned a level, and mapped to the framework. The MQF has level descriptors from Level 1 to 8. The level descriptors are useful for education and training providers as they describe the Knowledge, Skills and Competences and a set of Learning Outcomes, which indicate to the learner the end of a learning process.
Synoptic Assessment	A Synoptic Assessment can be defined as an assessment, which is designed to cover all the assessment grading criteria for a given unit.

## A.3. Assessment

### A.3.1. Scope

Assessment is an important element in any learning process. In order to ensure that assessment informs candidates and at the same time meets important conditions of reliability, validity and fairness, important rules and procedures must be adhered to. In particular, the assessment regulations and procedures that are explained in this section will ensure that assessments are:

- Of the required standard, quality and level
- Fair for all learners
- Valid and reliable

Each unit will be assessed by means of three assignments, one of which must be an assessment conducted within a controlled school environment. The assessment mode/type, criteria to be assessed and marks distribution are explained in Part B of the programme as part of the unit specifications.

### A.3.2. Programme Grade

A cumulative percentage mark, calculated on the basis of a sum total of all the 3 units, determines the final grade of candidates/ learners. Candidates/ Learners may qualify for Grades 1, 2, 3, 4, 5, 6 and 7. The results of candidates/learners who do not obtain at least a Grade 7 shall remain unclassified.

### A.3.3. Important Conditions

Candidates must obtain a minimum of 50 marks in each unit in order to obtain a grade classification.

If a candidate obtains a minimum of 50 in two units, but fails to satisfy the examiner in the remaining unit, s/he may be eligible to obtain Grade 6 or Grade 7.

If a candidate obtains less than 120 marks, his grade will be Unclassified. The same applies if a candidate does not obtain at least 50 marks in two units by the end of the programme.

### A.3.4. Re-Sits

If for a given unit, the total mark gained by a candidate is less than 50 marks, s/he will be eligible to re-sit. The re-sit assessment must consist of a synoptic assessment conducted within a school-controlled environment during the same academic year. The highest possible mark that may be obtained in this case is 60 marks.

Candidates who obtained an average of 50 marks or more on completion of the three tasks for a given unit will not be eligible for a re-sit to better their original mark.

Candidates who miss the controlled assessment for a justifiable reason will be eligible to sit for the synoptic assessment and may obtain full marks. The mark obtained in this assessment will replace the controlled assessment mark. The controlled assessment must not be more than 2 hours long.

## A.4. Quality Assurance

An important aspect of this programme is the quality assurance process that must be conducted throughout the implementation of the programme. Three main processes are to be conducted as stipulated in the table below.

Internal Verification of Assessment Briefs	All assessment briefs are to be internally verified before being issued to the candidates. Within this process important checks relating to learning outcomes, criteria to be assessed, validated and reliability are to be performed.
Internal Verification of Assessment Decisions	Once learners complete their work and assessments have been corrected, a representative sample of learners' work is to be internally verified.
External Verification	The process of external verification will ensure that programme quality and standards criteria are met.

## Part B: Unit Specifications

### B.1. Introduction

This part of the programme guide provides detailed specification for each of the 3 units that are to be implemented for the successful completion of the programme. The curriculum design adopted for the development of the units of study is based on the learning outcomes approach. The latter can be defined as "written statements of what a learner should be able to do/know/apply by the end of the learning process."

The structure of the unit specifications is presented below:



Unit Title	
Unit Description	
Learning Outcomes	
Unit Content	
Assessment Criteria	
Assessment Plan	

## B.2. Interpreting the Unit Specifications.

Under each grading criterion all the content that has to be covered can be found. Examples (e.g.), semi-colons and commas are used in the Learning and Assessment Programme. When semi-colons are used the students should be assessed on all the content prescribed. However, when the list is headed with example (e.g.), all the content is to be covered but the students are expected to be assessed on more than 50% of the content prescribed for that grading criterion.

In each grading criterion there is a command verb which specifies the level of content expected by the student, such as list, identify, outline, describe, explain etc. These verbs are defined by MATSEC in the glossary of verbs available on their website. It is of vital importance that the command verbs specified in the grading criteria remain unchanged in the assignment brief.

## B.2 Unit 1: Plant and Soil Science

Unit 1 Plant and Soil Science	
Unit Title	Plant and Soil Science
Unit Description	<p>Horticulture is the science, technology and business involved in the cultivation of fruit, vegetables, grapevines, olives, and other similar crops.</p> <p>In this unit the learners will enhance their knowledge on plant taxonomy and classification.</p> <p>Learners will be introduced to plant morphology and life cycles. In this unit learners will also understand the basics of horticultural production and trends.</p> <p>In addition learners will become familiar with plant nutrient requirements and fertilisation together with the common soil types, the basics of soil sampling and simple soil analysis techniques.</p>

### Learning Outcomes

#### Upon completing the unit, the learner will be able to:

- LO1. Understand the life cycle and morphologies of different organs of crop/ornamental plants' roots and shoot systems.
- LO2. Undertake a season's growth of different groups of vegetables;
- LO3. Apply a suitable fertilizer using the appropriate technique.
- LO4. Understand the purpose and methods used for soil analysis;
- LO5. Understand the soil factors which contribute to healthy plant growth;

## Unit Content

### ***LO 1. Understand the life cycle and morphologies of different organs of crop/ornamental plants' roots and shoot systems***

#### **K-1: Label different organs of crop/ornamental plants' roots and shoot systems**

- Crops/ ornamental plants: e.g.
  - Allium family: onion or garlic,
  - Apiaceae: carrot,
  - Cucurbitaceae family: zucchini,
  - Solanaceae: potato or tomatoes or aubergines or green peppers,
  - Asteraceae: Jerusalem artichokes
  - Brassica: broccoli or cauliflower or cabbages or Brussel sprouts;
  - Ornamental Plants: petunia or poinsettia
- Organs: leaf; stem; root; flower; seed; fruit.

#### **K-2: Describe different plant body tissues, transport system and plant cell components.**

- Plant body Tissues: parenchyma; collenchyma; sclerenchyma;
- Introduction to transport systems: xylem; phloem;
- Plant Cell Components: cell membrane; nucleus; cytoplasm; chloroplasts; vacuole; cell wall; mitochondria.

#### **K-3 Outline the stages of the life cycle of a named crop species.**

- Life cycle: seed; germination; seedling; growth; flowering; pollination; fruiting; seed dispersal.

#### **C-1: Explain the morphologies of different crops/ornamental plants.**

- Different crops/ornamental plants:
  - Monocot: onion or wheat;
  - Dicot: cabbage or carrot or bean.
- Morphology: structures of root, stem, leaf, flower, fruit, seed.

### ***LO 2. Undertake a season's growth of different groups of vegetables.***

#### **K-4: Outline the production of the most commonly grown vegetables in the Maltese Islands.**

- Commonly Grown Vegetables: e.g.: potato, tomato, green pepper, aubergine, garlic, onion, spring onion, gourds, zucchini, basil, squash, pumpkin, cucumber, lettuce, spinach, endive, cabbage, cauliflower, Brussel sprouts, broccoli, kohlrabi, globe artichokes, Jerusalem artichokes, celery, parsley, carrots, beetroot, peas, broad bean, runner beans.
- Production: soil preparation; spacing; sowing/transplanting; irrigation.

#### **K-5: Outline fruits' and vegetables' nutritional features.**

- Fruit and vegetable nutritional features: sugars; proteins; fats, vitamins; minerals; fibres.

#### **C-2: Predict possible future trends in the local consumption of fruits and vegetables.**

- Future trends: organic production versus non-organic production; fruits and vegetable consumption.

**A-1: Sow/transplant the number of plants/seeds needed for a specific land area according to your calculations.**

- Calculate area of plot;
- Calculate number of seeds/plants needed according to respective spacing.

**A-2: Practice routine work that is required for the production of a crop/ornamental plant using appropriate health and safety equipment.**

- Routine work: using appropriate health and safety equipment; tray preparation; seeding/sowing; tray tag marking; watering; transplanting; laying of irrigation pipes; using a hoe; weeding; harvesting.

***LO3. Apply a suitable fertilizer using the appropriate technique.***

**K-6: Indicate the appropriate nutrient/s for specific production objectives.**

- Nutrient: Macro; Micro;
- Production Objective: fast leaf growth; fast fruit growth; leaf and fruit turgidity; healthy flowering.
- Deficiency symptoms: stunting; total leaf chlorosis; interveinal chlorosis; leaf edge chlorosis; blossom end rot; tip burn; leaf purpling; loss of leaves; yellow spots; poor root growth.
- Fertilisers: straight; compound; organic; inorganic; foliar; water soluble; slow release.

**C-3: Discuss the advantages and disadvantages of manure use in vegetable production.**

- Advantages: e.g. nutrients, aeration, humus, drainage, water retention;
- Disadvantages: e.g. pathogens, nutrient leaching, bad odours, weeds, storage difficulties.

**C-4: Explain the hazards and risks in your working environment**

- Hazards: e.g. sharp objects, tools and machinery, fuel, electricity, direct sunlight, not wearing the appropriate PPEs, pesticides and fertilizers, lifting heavy objects, dust, heights;
- Risks: e.g. cuts, burns, injuries, infections, poisoning, electric shock, heat stroke, back pains, eye irritation, respiratory problems.
- Legislations:
  - Act 27 of 2000 – Occupational Health and Safety Authority Act;
  - LN44 of 2002 – Work Place (Minimum Health and Safety Requirements) Regulations,
  - LN 35 of 2003 – Protection against Risks of Back Injury at Work Placement Regulations,
  - LN 36 of 2003 – General Provisions for Health and Safety at Work Places Regulations,
  - LN121 of 2003 – Minimum Requirements for the use of Personal Protective Equipment at Work Regulations,
  - Malta’s National Action Plan for Sustainable Use of Pesticides (2013-2018).

**A-3: Apply the proper fertiliser to reduce a given deficiency in a vegetable plant using appropriate health and safety equipment.**

- Identification of deficiency;
- Choosing the suitable fertilizer;
- Applying the fertilizer.

***LO 4. Understand the purpose and methods used for soil analysis***

**K-7: Describe the process, tools and materials required to take and analyse soil samples.**

- Process: zig-zag pattern; depth of sample;
- Tools: auger; hand drill; spade; soil test kit;
- Materials: labelled bags; marker.

**K-8: Define the parameters that are commonly determined in soil sample analysis.**

- Parameters: pH; sodium; chloride; nitrogen; phosphorus; potassium; conductivity; calcium.

**C-5: Select plants that are the most suitable for specific soil parameters according to the results of a soil sample.**

- Soil Parameters: pH; sodium; conductivity.

***LO 5. Understand the soil factors which contribute to healthy plant growth.***

**K-9: Describe how biotic and abiotic soil factors can effect plant growth.**

- Soil types: The Maltese soils within the world reference base for soil resources.
- Biotic: e.g. bacteria, mycorrhizae, earth worms, pathogens;
- Abiotic: e.g. pH, soil water, soil texture, soil structure, temperature, nutrient availability, organic matter, porosity, drainage.

**K-10: List activities which can improve the soil fertility.**

- Activities: mulching; tilling; liming; fertilisation; addition of organic matter; crop rotation; soil topping; increase sand content.

## Assessment Criteria

Assessment criteria provide guidance on how the learners will be assessed in order to ensure that the learning outcome has been achieved. To achieve each outcome a learner must satisfy the following assessment criteria grid. The assessment criteria which will be assessed in the controlled assessment have been highlighted.

LO	Knowledge	Comprehension	Application
<b>LO1</b>	<p>K-1: Label different organs of crop/ornamental plants' roots and shoot systems.</p> <p>K-2: Describe different plant body tissues, transport system and plant cell components.</p> <p>K-3 Outline the stages of the life cycle of a named crop species.</p>	<p>C-1: Explain the morphologies of different crops/ornamental plants.</p>	
<b>LO2</b>	<p>K-4: Outline the production of the most commonly grown vegetables in the Maltese Islands.</p> <p>K-5: Outline fruits' and vegetables' nutritional features.</p>	<p>C-2: Predict possible future trends in the local consumption of fruits and vegetables.</p>	<p>A-1: Sow/transplant the number of plant/seeds needed for a specific land area according to your calculations.</p> <p>A2.Practice routine work that is required for the production of a crop/ornamental plant using appropriate health and safety equipment.</p>
<b>LO3</b>	<p>K-6: Indicate the appropriate nutrient/s for specific production objectives.</p>	<p>C-3: Discuss the advantages and disadvantages of manure use in vegetable production.</p> <p>C-4: Explain the hazards and risks that arise in your working environment.</p>	<p>A-3: Apply the proper fertiliser to reduce a given deficiency in a vegetable plant using appropriate health and safety equipment.</p>
<b>LO4</b>	<p>K-7: Describe the process, tools and materials required to take and analyse soil samples.</p> <p>K-8: Define the parameters that are commonly determined in soil sample analysis.</p>	<p>C-5: Select plants that are the most suitable for specific soil parameters according to the results of a soil sample.</p>	
<b>LO5</b>	<p>K-9: Describe how biotic and abiotic soil factors can effect plant growth.</p> <p>K-10: List activities which can improve the soil fertility.</p>		

### Assessment criteria – Marking scheme

4 marks are to be allocated for each knowledge assessment criteria (K1 to K10), for a total of 40 marks.

6 marks are to be allocated for each comprehension assessment criteria (C1 to C5), for a total of 30 marks.

10 marks are to be allocated for each application assessment criteria (A1 to A3), for a total of 30 marks.

Ass. No.	Assessment Mode	Percentage distribution
1	Assignment 1	26 - 34%
2	Assignment 2	26 - 34%
3	Controlled	38 - 42%

**N.B** In order to assess A- 1 and A-2 it is suggested that one type of crop is selected to plant/seed in a particular area in your school. The minimum area required to plant/seed crops per student is 6m<sup>2</sup>. It is suggested that the type of crop you select is cultivated and harvested during the scholastic year.

## B.3 Unit 2: Aquatic and Land Based Production

Unit 2 Aquatic and Land Based Production	
Unit Title	Aquatic and Land Based Production
Unit Description	<p>The objective of this unit is to build upon the land based production knowledge, skills and competences covered in unit 1 and introduce new concepts on aquatic production.</p> <p>In this unit the learners will be introduced to basic fish care techniques. The learner will be given an overview of the morphology and nutritional requirements of different fish species together with fish diseases and disorders, their prevention and cure.</p> <p>Furthermore in this unit the learners will become familiar with the major physiological processes of plants such as germination, photosynthesis and transpiration. The major tasks required for vegetable cultivation and propagation will also be tackled.</p>

### Learning Outcomes

#### Upon completion the unit, the learner will be able to:

- LO 1. Understand the morphology and nutritional requirements of different fish species.
- LO 2. Care for fish in order to prevent and cure diseases and correct disorders.
- LO3. Describe the main processes of plant physiology.
- LO4. Cultivate and care for a range of vegetables from field to market.
- LO5. Explain the propagation, care and harvesting requirements for different crops.



## Unit Content

### ***LO 1. Understand the morphology and nutritional requirements of different fish species***

#### **K-1 Outline the morphological differences of an ornamental and an edible fish species.**

- Types of fish:
  - Ornamental Fish:
    - Cold water: gold fish or mosquito fish or
    - Tropical: cichlids or Siamese fighter fish;
  - Edible fish: tuna or seabream or tilapia; pangassius.
- Morphology:
  - Exterior: fins; head; lateral line; scales;
  - Interior: skeleton; swim bladder; heart; gills; brain; reproductive organs.

#### **K-2 Identify the specific nutrients and their roles in fish.**

- Nutrients:
  - Proteins;
  - Carbohydrates;
  - Fat;
  - Fibre;
  - Vitamins: A;B;C;D;E;K
  - Minerals: calcium; phosphorus; sodium; potassium; iron; zinc.

#### **C- 1 Describe the nutritional requirements of different fish species at different life stages.**

- Life Stages: larva/fry; juvenile; adult; reproductive/broodstock.
- Nutritional Requirements: proteins; carbohydrates; fats.
- Different fish species: tuna; gold fish.

### ***LO 2. Care for fish in order to prevent and cure diseases and correct disorders.***

#### **K-3: Identify the most common ornamental/edible fish diseases and disorders.**

- Fish diseases:
  - Fin rot;
  - White spot (ich);
  - Fish pop eye;
  - Lateral line disease;
  - Parasites: e.g. lice;
  - Virus: e.g. nodavirus;
- Fish disorders: bloat; genetic disorders caused by in-breeding;

#### **K-4 Describe the correct treatment procedure to control the most common ornamental/edible fish diseases and disorders.**

#### **C-2: Explain tank and cage requirements of different fish species.**

- Tank requirements: size; temperature; salinity; pH; filtration (ammonia, nitrite, nitrate); light; aeration; water source; decor;
- Cage requirements: size; location; materials used.

**A-1 Perform routine tasks in the maintenance and upkeep of a fish tank taking into consideration the health and safety aspect.**

- Routine tasks: water change; cleaning; feeding; water testing and amendments; record keeping;
- Health and Safety: switch off electrical components before cleaning; be aware of sharp edges; wear rubber sole shoes; wash hands; handle chemicals with care.

**LO 3. Describe the main processes of plant physiology.**

**K-5: Describe the plant organs that are crucial for the intake and internal transport of water and nutrients.**

- Structure and Function of plant organs of monocots and dicots: xylem; phloem; roots; leaf.

**K-6: Describe different plant physiological processes.**

- Plant physiological processes: e.g. transpiration, translocation, photosynthesis, osmosis, germination, tropisms (photo and geo), respiration.

**C-3: Explain how light and/or temperature can be used to control flowering in horticulture.**

- Flower control: photoperiodism; vernalisation; artificial lighting; blackouts; heating; cooling.

**LO 4. Cultivate and care for a range of vegetables from field to market.**

**K-7: Describe the importance of record keeping for proper crop pest control and fertilizer application.**

- Types of records: date and field number; type of pathogens; weather condition; pesticide name and active ingredient; nutrient content of fertilizer; quantity/dose of chemical; method of application; type of crop.

**K-8: Describe the different symptoms of various plant diseases and nutritional deficiencies for a given vegetable species.**

- Vegetable Species: potatoes or onions.
- Symptoms of diseases:
  - Potato: early blight; late blight;
  - Onions: rust; downy mildew;
- Symptoms of deficiencies:
  - Potato: nitrogen; potassium;
  - Onions: nitrogen; phosphorus;

**C-4: Select the appropriate measures to fight against diseases and nutritional deficiencies in vegetable production.**

- Cultural practices: choice of resistant/tolerant propagative material; crop rotation; inter-cropping; solarisation; traps; field burning; tillage;
- Biological practices: biological control; manure;
- Chemical practices: sterilization; pesticides; artificial fertilizer.

**C-5: Explain the main factors influencing the proper harvesting time of different vegetables.**

- Main Factors: species and cultivar; weather conditions, fertility, overall care.

**A-2: Produce a range of vegetable plants from sowing/transplanting to market.**

- Range of vegetables: e.g. potatoes, spring onions, lettuce, cabbages.
- Post-harvest practices: Cleaning; grading; packaging; labelling; storage.

***LO 5. Explain the propagation, care and harvesting requirements for different crops.***

**K-9: Identify the different propagation techniques used for different crops.**

- Propagation techniques: seeding; grafting; cuttings; runners; bulb; rhizome; division; layering.

**K-10: Select a suitable growing medium for specific growing objectives.**

- Growing objectives: good water drainage; aeration; pathogen/pest free; nutrient dynamics and control
- Growing media: peat; compost; coconut fibre; soil; perlite; vermiculite; rockwool; expanded clay.

**A-3: Propagate a range of crops.**

- Propagation techniques: e.g. seeding, grafting, cuttings, runners, bulb, rhizome, division, layering.

## Assessment Criteria

Assessment criteria provide guidance on how the learners will be assessed in order to ensure that the learning outcome has been achieved. To achieve each outcome a learner must satisfy the following assessment criteria grid. The assessment criteria which will be assessed in the controlled assessment have been highlighted.

LO	Knowledge	Comprehension	Application
<b>LO1</b>	<p>K-1 Outline the morphological differences of an ornamental and an edible fish species.</p> <p>K-2 Identify the specific nutrients and their roles in fish.</p>	C- 1 Describe the nutritional requirements of different fish species at different life stages.	
<b>LO2</b>	<p>K-3: Identify the most common ornamental/edible fish diseases and disorders.</p> <p>K-4 Describe the correct treatment procedure to control the most common ornamental/edible fish diseases and disorders.</p>	C-2: Explain tank and cage requirements of different fish species	A -1 Perform routine tasks in the maintenance and upkeep of a fish tank taking into consideration the health and safety aspect.
<b>LO3</b>	<p>K-5: Describe the plant organs that are crucial for the intake and internal transport of water and nutrients.</p> <p>K-6: Describe different plant physiological processes.</p>	C-3: Explain how light and/or temperature can be used to control flowering in horticulture.	
<b>LO4</b>	<p>K-7: Describe the importance of record keeping for proper crop pest control and fertilizer application.</p> <p>K-8: Describe the different symptoms of various plant diseases and nutritional deficiencies for a given vegetable species.</p>	<p>C-4: Select the appropriate measures to fight against diseases and nutritional deficiencies in vegetable production.</p> <p>C-5: Explain the main factors influencing the proper harvesting time of different vegetables.</p>	A-2: Produce a range of vegetable plants from sowing/transplanting to market.
<b>LO5</b>	K-9: Identify the different propagation techniques used for different crops.		A-3: Propagate a range of crops.

	K-10: Select a suitable growing medium for specific growing objectives.		
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### Assessment criteria - Marking scheme

4 marks are to be allocated for each knowledge assessment criteria (K1 to K10), for a total of 40 marks.  
 6 marks are to be allocated for each comprehension assessment criteria (C1 to C5), for a total of 30 marks.  
 10 marks are to be allocated for each application assessment criteria (A1 to A3), for a total of 30 marks.

Ass. No.	Assessment Mode	Percentage distribution
1	Assignment 1	26 - 34%
2	Assignment 2	26 - 34%
3	Controlled	38 - 42%

## B.4 Unit 3: Rabbit Care and Genetics

Unit 3 Rabbit Care and Genetics	
<b>Unit Title</b>	Rabbit Care and Genetics
<b>Unit Description</b>	<p>The breeding of rabbits is considered as a key agribusiness sector in Malta, due to the fact that rabbit is a Maltese traditional dish, and also for rabbit shows.</p> <p>This unit will familiarize learners with the particular care required in the breeding of rabbits. This unit will look at the origin, history and process of domestication of rabbits.</p> <p>Learners will also look at the requirements of breeding rabbits in terms of feed, water and micro-climatic conditions. Learners will also be exposed to specific housing requirements and equipment. Learners will also consider the economic significance and production features of different breeds and hybrids of rabbits.</p> <p>In this unit learners will also look at the specific morphology, reproduction, physiology, genetics, specific diseases, disorders and their treatments.</p>

### Learning Outcomes

#### Upon completion of this unit the learner will be able to:

- LO1. Understand the morphologies and genetic principles of rabbit production.
- LO2. Undertake adequate feed, water and housing conditions for rabbits at different growth stages.
- LO3. Apply adequate preventive and curative measures against diseases, parasites and disorders common in rabbits.
- LO4. Explain the reproductive system and the reproduction phases of rabbits.
- LO5. Understand the importance of humanely slaughtering rabbits for meat production.

## Unit Content

### ***LO 1. Understand the morphologies and genetic principles of rabbit production.***

**K-1: State the most important features required in common rabbit breeds and hybrids in relation to their breeding purpose.**

- History: the wild rabbit, domestication of the rabbit, economic importance.
- Rabbit anatomy: overview of skeletal, muscular, respiratory, circulatory, digestive and nervous systems of the rabbit, skin, external appearance.
- Common Rabbit Breeds:
  - Meat Market: New Zealand White; Californian; Hyla
  - Pet: Netherland dwarf; Lionhead; Flemish giant;
  - Fur Industry: Rex; Angora
- Important features:
  - Meat Market: rapid growth and maturation; high muscle to bone ratio
  - Pet: long life span; friendly personality;
  - Fur Industry: dense coat and homogenous coat; colour.

**K – 2: Define the terms allele, gamete, gene/DNA, and chromosome.**

**K – 3: Outline Mendel’s first law and second law.**

Mendel’s first, second and third laws and their implications.

**K -4: Distinguish between the basic concepts of mitosis and meiosis.**

- Basic overview of Mitosis: for cell replication;
- Basic overview of Meiosis: for gamete formation.

**C-1: Select the rabbits with the required features for future breeding.**

- Selection of rabbits:
  - General Features: alert and lively; has clear eyes; shiny coat; free from disease; free from disorder; parents have the required physical traits; blood lines;
    - For meat production: weight gain; final weight;
    - For show rabbits: according to standards for four breeds;
    - For fur industry;
  - Males: at least six months old; in possession of robust and good muscular structure; is not indifferent to females; testes should be well visible.
  - Females: correct weight according to breed; have at least eight visible mammary glands; produces a good number of kits per litter.

**C2:- Predict the distribution of traits in F1 and F2 generations using Mendel’s laws.**

- Terms: Homozygous dominant; Homozygous recessive; Heterozygous.

- Distribution of traits in F1 and F2 using genetic diagrams through Mendel's law: Genetic cross diagram or Punnet square diagram.

***LO2. Undertake adequate feed, water and housing conditions for rabbits at different growth stages.***

**K-5: Describe favorable microclimatic conditions for growing rabbits.**

- Microclimatic conditions: Quality of air/ventilation; temperature; lighting; humidity.

**C-3: Explain the feed, water and housing/cage requirements of meat/show rabbits in different stages of their lives.**

- Life stages: e.g. Kit, juvenile, adult, parent stock.
- Digestive System
- Feed:
  - General nutritional requirements: proteins; carbohydrates; fats; fibre; minerals; vitamins;
  - Special dietary requirements according to the type of rabbit and life stage:
    - Meat Rabbit: protein; fat; calcium
    - Show Rabbits: protein, fibre; calcium
- Water: Available and uncontaminated;
- Housing/Cage requirements:
  - General requirements: LN 244 of 2013 Protection of Animal offered in Pet Shops (Minimum Standards) Regulations; inner nest box for breeding females (does).
  - Meat rabbit: fattening cage;
  - Show rabbit: large cage.

**A-1: Demonstrate correct practice for feeding, watering and cleaning tasks in rabbit production using appropriate PPEs.**

- Correct Practices:
  - Feeding: amount and type of feed according to life stage; according to growing objective; good feeding practice;
  - Watering: free flowing;
  - Cleaning: cleaning of the cage and nest box; cleaning of equipment for feeding and watering; removing of excrement;
  - PPE: gloves; overall; appropriate attire.

***LO 3. Apply adequate preventive and curative measures against diseases, parasites and disorders common in rabbits.***

**K6: Identify the most common rabbit diseases and disorders.**

- Rabbit diseases:
  - Gastrointestinal: coccidiosis;
  - Respiratory disease: snuffles; pasteurellosis;
  - Viral disease: myxomatosis; viral haemorrhagic disease;
  - Ear and skin: ear canker;
- Rabbit Disorders: malocclusion/buck teeth; sore hocks.



**K-7: Identify the causes of rabbit diseases and disorders and the correct prevention measures for rabbits.**

- Probable Causes - Diseases:
  - Gastrointestinal: e.g. transport stress, not enough crude fibre, too much protein, watering from contaminated sources;
  - Respiratory: e.g. dust/ammonia, abrupt change in temperature, airflow;
  - Viral diseases: lack of proper vaccination;
  - Ear and skin: mites;
- Probable Causes- Disorders:
  - Malocclusion/buckteeth: in-breeding;
  - Sore hocks: inadequate flooring for breed.
- Prevention measures: good hygiene; vaccinations; regular inspection; proper microclimatic and housing conditions; farm bio-security; good record keeping; adequate feeding; clean and disinfect water system; good feed storage; farm disinfection.

**C-4: Justify the proper treatments for different diseases, disorders and pests**

- Bacterial:
  - Diseases: e.g. Coccidiosis, Snuffles, Pasteurellosis
  - Treatment: drugs and/or antibiotics;
- Viral:
  - Diseases: Myxomatosis, Viral haemorrhagic disease
  - Treatment: culling;
- Parasitic Disease:
  - Disease: Ear canker
  - Treatment: ear drops/vaccination;
- Disorders:
  - Types of disorders: Malocclusion/buckteeth, sorehocks
  - Treatment of Malocclusion/buckteeth: cutting the teeth with sharp pliers to the gums
  - Treatment of sorehox: applying disinfectants;
- Pests
  - Types of Pests: Mites, Fleas
  - Treatment: insecticide/vaccination.

**A-2: Monitor a rabbit's health condition to assess current status through documentation and by using the appropriate PPEs.**

- Rabbit's health condition:
  - free from disease, disorders and pests
    - checkup: eyes, ears, mouth, genitals, rear, coat, feet.
  - normal appetite
  - vaccinations
- PPE'S: gloves and overall to protect against zoonoses and allergies.

**LO 4. Explain the reproductive system and the reproduction phases of rabbits.**

**K-8: Describe the structure and function of a rabbit's reproductive system.**

- Males: e.g. penis, testes, prostate, cowpers gland, seminal vesicle, urethra;

- Females: e.g. ovaries, vulva, uterus, cervix, vagina, uterotubial junction.

**K-9: Describe a rabbit's behavior and anatomical features as related to its reproductive stage.**

- Anatomical features:
  - Males: well developed genitals;
  - Females: vulva becomes red and is larger;
- Behaviour:
  - Males: become more aggressive; mounting; spraying of urine; scent marking;
  - Females: raise tail; assume lordosis.

**A-3: Conduct a basic reproductive scheme for commercial rabbits.**

- Reproductive phases: copulation; ovulation; fertilisation; gestation; birth; lactation;
- Phases as affected by surrounding environment: lighting; temperature;
- Planning breeding activities: seasonal breeding; breeding schedule.

***LO 5. Understand the importance of humanely slaughtering rabbits for meat production.***

**K-10: Outline the different methods of rabbit slaughtering.**

- Different methods: Stunning; dislocation; halal; striking.

**C-5: Explain the importance of slaughtering rabbits using a humane technique in accordance to legislation.**

- Importance of humane slughtering – LN 260 of 2003: Animal slaughter or killing (protection)
- Act 25 of 2001: Animal Welfare Act.

## Assessment criteria

The Assessment criteria will provide guidance on how the learner will be assessed in order to ensure that the learning outcomes have been achieved. To achieve each outcome a learner must satisfy the following assessment criteria. The assessment criteria which will be assessed in the controlled assessment have been highlighted.

LO	Knowledge	Comprehension	Application
<b>LO1</b>	<p>K-1: State the most important features required in common rabbit breeds and hybrids in relation to their breeding purpose.</p> <p>K – 2: Define the terms allele, gamete, gene/DNA, and chromosome.</p> <p>K – 3: Outline Mendel’s first law and second law.</p> <p>K -4: Distinguish between the basic concepts of mitosis and meiosis.</p>	<p>C-1: Select the rabbits with the required features for future breeding.</p> <p>C2:- Predict the distribution of traits in F1 and F2 generations using Mendel’s laws.</p>	
<b>LO2</b>	<p>K-5: Describe favorable microclimatic conditions for growing rabbits.</p>	<p>C-3: Explain the feed, water and housing/cage requirements of meat/show rabbits in different stages of their lives.</p>	<p>A-1 Demonstrate correct practice for feeding, watering and cleaning tasks in rabbit production using appropriate PPEs.</p>
<b>LO3</b>	<p>K-6: Identify the most common rabbit diseases and disorders.</p> <p>K-7: Identify the causes of rabbit diseases and disorders and the correct prevention measures for rabbits.</p>	<p>C-4: Discuss the proper treatments for different diseases, disorders and pests</p>	<p>A-2: Monitor a rabbit’s health condition to assess current status using the appropriate PPEs</p>
<b>LO4</b>	<p>K-8: Describe the structure and function of a rabbit’s reproductive system.</p> <p>K-9: Describe a rabbit’s behavior and anatomical features as related to its reproductive stage</p>		<p>A-3: Conduct a basic reproductive scheme for commercial rabbits</p>

<b>LO5</b>	K-10: Outline the different methods of rabbit slaughtering	C-5: Explain the importance of slaughtering rabbits using a humane technique in accordance to legislation	
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### Assessment criteria – Marking scheme

4 marks are to be allocated for each knowledge assessment criteria (K1 to K10), for a total of 40 marks.  
 6 marks are to be allocated for each comprehension assessment criteria (C1 to C5), for a total of 30 marks.  
 10 marks are to be allocated for each application assessment criteria (A1 to A3), for a total of 30 marks.

<b>Ass. No.</b>	<b>Assessment Mode</b>	<b>Percentage distribution</b>
1	Assignment 1	26 - 34%
2	Assignment 2	26 - 34%
3	Controlled	38 - 42%

## Appendix 1 – Suggested Resources

**This list is not intended to be exhaustive but should be taken as a guide.**

Preferably 2 tumuli of land suitable for cultivation (fields)	
Manure clamp	
Cesspit	
Storage for agricultural machinery	
Storage for fertilizer and pesticides	
Storage for fodder and animal feed	
Class room with interactive monitor or LCD projector	
Rabbitry	
<ul style="list-style-type: none"> <li>• Extractor</li> <li>• Drainage system to cesspit</li> <li>• Buffer tank 50 litres</li> <li>• Light fixtures with timer</li> <li>• Sink - with hot and cold water</li> <li>• Rabbit cages with nest boxes ,feeder and automatic nipple drinkers</li> <li>• Wooden bench approx. - 1500mmX2000mmX1000mm</li> </ul>	
Dressing rooms with lockers	
Toilets with shower	
Running water	
Adequate supply of second class water for irrigation	
Irrigation system with filter and adjustable doser	
Various agricultural tools *	
Stock of suitable garage tools (sockets, pliers, wire-brush etc.)	
Aquariums approx. 35lit completed with light, filters and heaters. Large breeders. Aquarium thermometers. Water testing kit. Aquarium magnetic glass cleaners. Aquarium siphon. Aquarium water conditioner. Small air pump completed with 1m pipe and air stone.	
String trimmer	
Chainsaw	
Manual knapsack sprayer	
Petrol rotary tiller	
Diesel rotovator	
Fire alarm system	
Fire fighting equipment **	
Intruder Alarm system	
Telephone and data network (internet access)	
Access to computer laboratories	
Digital camera (Video and Photo)	
Microscope slides***	

External Hard Drive	
External Pen Drive Storage	
External DVD/CD writer	
Soil testing kit	
Scientific apparatus****	
Personal Protective Equipment*****	
Posters and Models*****	

- \* Hoes
  - Fork hoes
  - Pressure manual piston pump 5lit
  - Wood dibbers
  - Riddle
  - Rake
  - Pruning shears (secateurs)
  - Grass shears
  - Lopper
  - Spades
  - Shovels
  - Garden trowels
  - Pitch fork
  - Garden fork
  - Manual hedge trimmer
  - Grafter knife
  - Pruning saws
  - Folding hand saws
  
- \*\* Cylinder CO2
  - Cylinder Afff
  - Fire Blanket
  - Dry powder
  
- \*\*\* Root apical meristem
  - Shoot apical meristem
  - Monocot root cross section
  - Dicot root cross section
  - Monocot stem showing vascular bundle
  - Dicot stem showing vascular bundle
  - Annual rings woody stem
  - Dicot leaf cross section
  - Lower epidermis (leaf) showing stomata

Typical plant cell  
Sieve tube element phloem longitudinal section  
Cell division - mitosis  
Cell division - meiosis  
Parenchyma cells  
Collenchyma cells  
Sclerenchyma cells  
Xylem cells longitudinal section  
Root tip with hair roots  
Case to hold the slides in

\*\*\*\* LED microscopes with 4x, 10x and 40x with a max magnification of 400x. With power supply (not mirror)  
Iodine solution for testing for starch (photosynthesis)  
Simple Potometer to investigate the rate of water uptake and transpiration in plants.  
Digital balance with overload protection/Auto shut off/stainless steel pan/Readability = 0.1g  
Glass beakers pyrex 600ml  
Hand magnifiers glass with metal frame  
Visking tubing 30 metres, flat size 25-27mm  
Stands and clamps (metal rod with rubber lined clamp)  
Glass rods  
Polyethene resealable bags (15cmx23cm)  
Polyethene Wash bottles (500ml)  
Pyrex Beakers (500ml)  
Petri dishes (90mm)  
(packs)Filter papers - Suitable for soil  
Safety glasses  
Stainless steel spatulas (140mm)  
Retort stand + bosshead + clamp  
Plastic test tube racks  
Wooden test tube holder  
Soda glass boiling tubes with rim - box  
Economy test tubes (16x100mm) - box  
Plastic trays (312x425x77mm)  
Student Dissection Kit  
Borosilicate glass measuring cylinders (100ml)  
Disposable pasteur pipettes – box  
Test tubes brushes to fit ordered  
Boiling tubes brushes to fit ordered  
Tripod + wire gauze

\*\*\*\*\* Dark green safety dungarees s/m/l

Black safety shoes

Dark green tall agricultural wellingtons

Garden gloves s/m/l

Disposable nitrile gloves

Pesticide face mask including extra filter

Clear safety goggles

\*\*\*\*\*Rabbit organ poster

Rabbit organ model

Fish organ poster

Fish organ model

Plant posters

Plant body map