NATIONAL COUNCIL FOR TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING

APRIL 2023

PROPOSED OCCUPATIONAL STANDARDS

OCCUPATION: CROP PLANTING TECHNICIAN

LEVEL: NTA 6

TABLE OF CONTENT

CONTENTS

ABBREVIATIONS ii

GLOSSARY OF TERMS iii

1.0. INTRODUCTION 1

2.0. OCCUPATIONAL STANDARD DEVELOPMENT PROCESS 2

3.0. THE SCOPE AND OVERVIEW OF THE OCCUPATION STANDARDS FOR CROP PLANTING TECHNICIANS 2

4.0. VALIDITY PERIOD 4

5.0. OCCUPATIONAL STANDARDS 4

5.1 OCCUPATIONAL STANDARDS FOR CROP PLANTING TECHNICIAN - NTA 6 5

TABLE 1: DACUM CHARTS FOR CROP PLANTING TECHNICIAN - NTA 6 41

ABBREVIATIONS

CBET	Competency Based Education and Training
IPM	Integrated Pest Management
NACTVET	National Council for Technical and Vocational Education and Training
NOS	National Occupational Standards
OS	Occupational Standards
PSCMF	Plant Special Composite Mixing Fertilizer
TET	Technical Education and Training
TVET	Technical and Vocational Education and Training

GLOSSARY OF TERMS

Circumstantial Knowledge:	Detailed knowledge, which allows the decision-making in regard to different circumstances and cross cutting issues.
Competence:	The ability to use knowledge, understanding, practical, and thinking skills to perform effectively to the workplace standards required in employment.
Competency:	A description of the ability one possesses when able to perform a given occupational task effectively and efficiently.
Competency-based Education:	An instructional programme that derives its content from validated tasks and bases assessment on the learner's performance.
Curriculum:	A description or composite of statements about "what is to be learned" by the trainee/student in a particular instructional programme; a product that states the "intended learning outcomes".
Educational/Training Programme:	The complete curriculum and instruction (what and how) that is designed to prepare a person for employment in a job or other particular performance situation.
Occupation:	A specific position requiring the performance of specific tasks – essentially the same tasks are performed by all employees having the same title. (Example: Crop Planting Engineer)
Occupational Area:	This is a broad grouping of related jobs. (Example: food service)
Occupational Competence:	The application of knowledge and skills that consistently meet the standards required by the work context.
Occupational Standards:	Specific requirements of competences people are expected to demonstrate in a particular occupational area, including knowledge and relevant attitudes. They also act as a performance tool of assessment of the prescribed outcomes.
Occupational/Job Analysis:	A process used to identify the tasks that are important to employees in any given occupation**.**
Performance Criteria:	Indicate expected end results or outcomes in the form of evaluative statements.
Skills:	The ability to perform occupational tasks with a high degree of proficiency within a given occupation. Skill is conceived of as a composite of three completely interdependent components: cognitive, affective, and psychomotor.

Standards:	A set of statements, which if proved true under working conditions, means that an individual is meeting an expected level and type of performance.
Task Analysis:	The process of analysing each task to determine the steps, circumstantial knowledge, attitudes, performance standards, tools and materials needed, as well as safety concerns required for the employees performing it.
Task:	A work activity that has a definite beginning and ending, is observable or measurable, and consists of two or more definite steps that leads to a product, service, or decision.
Underpinning Knowledge:	Crucial knowledge that an individual must acquire in order to demonstrate competences that are associated in performing a given task.
Verification Process:	The process of having experts review and confirm the importance of the task (competency) statements identified through occupational analysis. Other questions, such as the degree of task learning difficulty are also frequently asked. This process is also sometimes referred to as validation.

1.0. INTRODUCTION

Technical Education and Training (TET) is one of the most important education sub-sectors in Tanzania, responsible for developing a skilled workforce to support the country's industrialization economic agenda. Tanzania's *Development Vision 2025* intends to raise the country's economy to a middle-income status. This requires a skilled workforce that is aligned with the needs of the public and private sectors of the economy. The National Council for Technical Education has begun the job of drafting Occupational Standards that will eventually be adopted as National Occupational Standards for TET in order to ensure that it meets the needs of the labour market and the country's economic agenda.

National Occupational Standards (NOS) are performance criteria that are matched with labour market demands. Each National Occupation Standard describes functions, performance standards, and knowledge/understanding for one important function or task. They combine skills, knowledge, and attitudes to describe best practice. They are useful tools for establishing job roles, personnel recruiting, supervision, and appraisal, as well as TET standards. They're also helpful for benchmarking and harmonizing qualifications on a national and international level. Standards, in general, provide a solid framework for high-quality TET that is labour market-relevant, current, and consistent in delivery across all public and private institutions.

However, it must be noted that, Occupational Standards and Training standards/qualifications standards are different. Occupational standards are defined in terms of activities performed by a person in a selected occupation (e.g., an electrical engineer designs electrical wiring circuits, performs troubleshooting in electrical wiring, etc.) and they are usually defined by employers following procedures agreed upon by all stakeholders. Education and training standards are developed from the activities defined in occupational standards, and they include learning objectives to ensure that the necessary skills and knowledge are developed by a person to enable him or her to function at an agreed level in an occupation. Education and Training standards are used to define curricula in training institutions. It is however critical that there must be a direct link between the occupational standards and the training standards to respond to the demands of the labour market.

In TET delivery, Tanzania adopted the Competence Based Education and Training (CBET) approach. The CBET approach focuses on providing learners with the skills and knowledge required to meet the occupational standards. Occupational standards are thus the starting point for developing competency-based training (CBET) programmes. TET institutions will be required to benchmark their curricula with relevant occupational standards.

Occupational Standards are developed based on a given occupation's current and future demands. As a result, they serve as a means of bridging the gap between the worlds of employment and technical education and training (TET).

The Crop Planting Technician has its own set of occupational standards. The document explains how the occupational standards were developed, as well as the scope, the occupational profile in the form of DACUM charts, and the Occupational Standards.

2.0. OCCUPATIONAL STANDARD DEVELOPMENT PROCESS

The Occupational standards development process began with an examination of major documents that guide Tanzanian skill development. The *10-year National Skills Development Strategy (2016-2026)* was one of the documents reviewed, and it outlined six (6) economic sectors that should be prioritized when developing skills development programmes.

These sectors include: Transport and Logistics, Tourism and Hospitality, Agribusiness, Construction, Energy and ICT. NACTE labour market reports were also used in the literature review to determine the skills demand in the Tanzanian labour market as a whole.

After the literature review, a workshop comprised of expert workers and educators with substantial knowledge and experience in the occupation conducted an occupational analysis utilizing the DACUM approach to produce the occupational profile. The analysis resulted in DACUM Charts, which are attached as Appendix 1 to this document.

The occupational standards were then developed. Experts in Occupational Analysis and the Development of Occupational Standards facilitated the workshop. Interviews, online surveys, and a stakeholder forum were used to validate the Occupational Standards. Engineers, supervisory technicians on the job, and experienced Crop Planting Technicians were key informants in the survey to discover occupational trends. This information was used to gain insight from the workplaces regarding trends and changes in the profession, including how well graduates are prepared for working in the occupation. A total of ... online surveys were completed by experts from the labour market across the country. Apart from the surveys aiding in defining the scope for the occupational analysis, they also served to engage a wide cross-section of experts in the occupation. Apart from this, the stakeholders' forum was attended by ... participants from different parts of the country representing various companies.

3.0. THE SCOPE AND OVERVIEW OF THE OCCUPATION STANDARDS FOR CROP PLANTING TECHNICIANS

These standards cover a broad range of duties and tasks that can be performed by a Crop Planting Technician. However, the occupational standards are not meant to replace individual job descriptions.

Instead, they are to be used for guidance in defining skill levels and knowledge for the technician in specific settings or positions. The Crop Planting Technician may perform tasks in a number of key areas of the Occupational Standards, but not necessarily in all areas. For example, in large operations, other individuals may be employed or designated to perform specific tasks.

The Crop Planting Technician shall perform tasks such as sowing, seedling raising, seedling breeding, field planting, field water and fertilizer management, and disease and insect pest control of common crops under the supervision of engineers. Generally, the Crop Planting Technician performs the following responsibilities:

a) Pretreatment for sowing

b) Preparation of seedbed soil

c) Production of seedbeds

d) Crop seedbed seedling raising

e) Preparation of soilless culture substrates

f) Spaced sowing in the plug tray

g) Seedling raising in the substrates of plug trays

h) Cuttage propagation

i) Layering propagation

j) Division propagation

k) Preparation of crops before field planting

l) Determination of field planting time and density

m) Field planting of seedlings

n) Management of seedlings during field planting

o) Installation and use of micro-irrigation systems in the field

p) Reasonable irrigation

q) Topdressing

r) Correct diagnosis of common crop diseases

s) Proper identification of common crop pests

t) Crop disease control

u) Crop insect pest control

The Occupational Standards have been clustered into NTA qualification levels, i.e. NTA level 4, 5 and 6.

4.0. VALIDITY PERIOD

Due to the rapid development of technology, the validity period of occupational standards is 3-5 years. The review will proceed in the same manner as the one before it, with new occupational standards being developed based on current trends of the labour market.

5.0. OCCUPATIONAL STANDARDS

5.1 OCCUPATIONAL STANDARDS FOR CROP PLANTING TECHNICIAN - NTA 6

OCCUPATION	CROP PLANTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	SOWING AND SEEDLING RAISING	**DUTY NO.**	601
TASK TITLE	PRETREATMENT FOR SOWING	**TASK NO.**	6011
PERFORMANCE CRITERIA	The person performing this task must be able to perform the pretreatment for sowing in accordance with crop types and planting requirements.		
RANGE STATEMENT	The task can be performed in the seed germination chamber or laboratory under the supervision of senior technicians or crop planting engineers. The tools and equipment to be used include: 1. Germination boxes and filter paper; 2. Seed germination chambers or light germination boxes; 3. Thermostats; 4. Tweezers; 5. Thermometers; 6. Beakers; 7. Gauzes, filter paper, etc.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select appropriate tools and equipment; 2. Screen quality seeds; 3. Dry the seeds; 4. Disinfect the seeds; 5. Soak seeds to accelerate germination; 6. Perform seed germination tests; 7. Clean the tools, equipment and workplaces; 8. Safely arrange and store the tools and equipment.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Select quality seeds; 1.2 Dry the seeds; 1.3 Disinfect the seeds; 1.4 Soak seeds to accelerate germination; 1.5 Operate seed germination tests. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of seed germination; 2.2 Principles of seed disinfection. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Necessary conditions for seed germination; 3.2 Seed disinfection methods; 3.3 Seed germination test requirements; 3.4 Seed germination percentage and germination potential criteria;

	3.5 Seed germination characteristics of different crops; 3.6 Seed quality inspection indicators; 3.7 Geography and climate of crop planting areas; 3.8 Seed-related regulations of local governments. **4.0 Essential Skills** 4.1 DIY ability; 4.2 Teamwork skills; 4.3 Computational and data analysis skills; 4.4 Report writing ability; 4.5 Communication and expression skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The pretreatment for sowing is accomplished in accordance with crop types and planting requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Safe use of equipment.

OCCUPATION	CROP PLANTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	SOWING AND SEEDLING RAISING	**DUTY NO.**	601
TASK TITLE	PRODUCTION OF SEEDBEDS	**TASK NO.**	6012
PERFORMANCE CRITERIA	The person performing this task must be able to produce seedbeds in accordance with crop types and planting requirements.		
RANGE STATEMENT	The task can be performed in the nursery site under the supervision of senior technicians or crop planting engineers. The tools and equipment to be used include: 1. Measuring tapes; 2. Shovels, pickaxes, rakes and other farm implements; 3. Rotary cultivators; 4. Harrowing machines; 5. Nutrition pots.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select appropriate tools and equipment; 2. Operate the rotary cultivator; 3. Till and harrow the land; 4. Make borders (foundation of seedling raising seedbeds); 5. Prepare nutrient soils for seedlings; 6. Make seedling raising seedbeds; 7. Clean the tools, equipment and workplaces; 8. Safely arrange and store the tools and equipment.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Select the nursery site; 1.2 Prepare nutrient soils for seedlings; 1.3 Operate the rotary cultivator; 1.4 Produce seedbeds. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of seedbed site selection; 2.2 Basic requirements for seedbeds. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Nutrient soil composition and proportioning requirements; 3.2 Seedbed production standards; 3.3 Composition and characterization of nutrient soils; 3.4 Nutrient requirements of different crops at the seedling stage; 3.5 Differences in soil properties; 3.6 Seedling-related regulations of local governments.

	4.0 Essential Skills 4.1 DIY ability; 4.2 Teamwork skills; 4.3 Computational and data analysis skills; 4.4 Report writing ability; 4.5 Communication and expression skills; 4.6 Problem analysis and solving skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Seedbeds for conventional seedling raising are produced in accordance with crop types and planting requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Safety operation of equipment.

OCCUPATION	CROP PLANTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	SOWING AND SEEDLING RAISING	**DUTY NO.**	601
TASK TITLE	CONVENTIONAL SEEDLING RAISING IN SEEDBEDS	**TASK NO.**	6013
PERFORMANCE CRITERIA	The person performing this task must be able to conduct conventional seedling raising in accordance with crop types and planting requirements.		
RANGE STATEMENT	The task can be performed in the production farm under the supervision of senior technicians or crop planting engineers. The tools and equipment to be used include: 1. Watering cans; 2. Seeds; 3. Mulching films; 4. Seedbeds for sowing (flat trays); 5. Seedling seedbeds (nutrition pots).		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select appropriate tools and equipment; 2. Sow open-field seeds; 3. Perform seedling thinning; 4. Weed; 5. Perform seedbed sowing; 6. Regulate and control the microclimatic environment of the seedbed; 7. Separate seedlings; 8. Clean the tools, equipment and workplaces; 9. Safely arrange and store the tools and equipment.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Conduct open-field direct sowing (sowing, strip sowing, hole sowing); 1.2 Perform seedling thinning; 1.3 Weed; 1.4 Conduct seedbed sowing; 1.5 Regulate seedbed temperature, light, and moisture; 1.6 Control diseases and insect pests during the seedling stage. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles applicable to open-field direct sowing; 2.2 Principles of seedbed microclimate regulation. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Methods of sowing different crops; 3.2 Indicators of environmental regulation of microclimate in seedbeds; 3.3 Occurrence regularity and control methods for diseases and insect pests during the seedling stage;

	3.4 Ways and means of sowing different crops; 3.5 Methods of calculating seed usage for different crops; 3.6 Periods and methods of seedling thinning of different crops; 3.7 FAQs and solutions for the seedling stage; 3.8 Methods for environmental regulation of microclimate in seedbeds. **4.0 Essential Skills** 4.1 DIY ability; 4.2 Teamwork skills; 4.3 Computational and data analysis skills; 4.4 Report writing ability; 4.5 Communication and expression skills; 4.7 Problem analysis and solving skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Sowing and conventional seedling raising are conducted in accordance with crop types and planting requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Safety operation of equipment.

OCCUPATION	CROP PLANTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	SOWING AND SEEDLING RAISING	**DUTY NO.**	601
TASK TITLE	PREPARATION OF SOILLESS CULTURE SUBSTRATES	**TASK NO.**	6014
PERFORMANCE CRITERIA	The person performing this task must be able to prepare soilless culture substrates in accordance with crop types and planting requirements.		
RANGE STATEMENT	The task can be performed in the production farm under the supervision of senior technicians or crop planting engineers. The tools and equipment to be used include: 1. Mixers; 2. Shovels; 3. Watering cans; 4. Seedling substrates.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select appropriate tools and equipment; 2. Operate the substrate mixer; 3. Select the type of substrates; 4. Prepare seedling substrates; 5. Clean the tools, equipment and workplaces; 6. Safely arrange and store the tools and equipment.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Operate the substrate mixer; 1.2 Prepare seedling substrates. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of substrate selection; 2.2 Principles of seedling substrate proportioning. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Physicochemical properties of commonly-used substrates; 3.2 Seedling substrate type proportioning and dosage; 3.3 Characterization of commonly-used seedling substrates; 3.4 Proportioning requirements for seedling substrates; 3.5 Calculation of the total amount of seedling substrates and the amount of each component. **4.0 Essential Skills** 4.1 DIY ability; 4.2 Teamwork skills;

	4.3 Computational and data analysis skills; 4.4 Report writing ability; 4.5 Communication and expression skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Soilless culture substrates are prepared in accordance with crop types and planting requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Safety operation of equipment.

OCCUPATION	CROP PLANTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	SOWING AND SEEDLING RAISING	**DUTY NO.**	601
TASK TITLE	PLUG SOWING	**TASK NO.**	6015
PERFORMANCE CRITERIA	The person performing this task must be able to perform plug sowing in accordance with crop types and planting requirements.		
RANGE STATEMENT	The task can be performed in the production farm under the supervision of senior technicians or crop planting engineers. The tools and equipment to be used include: 1. Plug trays; 2. Seedling substrates; 3. Seeds; 4. Germination acceleration room; 5. Fully automatic seeders; 6. Seedling raising greenhouses.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select appropriate tools and equipment; 2. Operate the fully automatic seeder; 3. Perform plug sowing; 4. Regulate the environmental conditions of the germination acceleration room; 5. Clean the tools, equipment and workplaces; 6. Safely arrange and store the tools and equipment.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Perform artificial sowing; 1.2 Operate the fully automatic seeder; 1.3 Regulate the environmental conditions of the germination acceleration room; 1.4 Perform operating procedures of plug sowing. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Working principles of the seeder; 2.2 Working principles of the germination acceleration room. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Mechanical plug sowing standards; 3.2 Artificial plug sowing standards; 3.3 Methods for environmental regulation of microclimate in the germination acceleration room; 3.4 Seedbed sowing germination and emergence management methods; 3.5 FAQs and solutions for the germination stage.

	4.0 Essential Skills 4.1 DIY ability; 4.2 Teamwork skills; 4.3 Computational and data analysis skills; 4.4 Report writing ability; 4.5 Communication and expression skills; 4.6 Problem analysis and solving skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Plug sowing is performed in accordance with crop types and planting requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Safety operation of equipment.

OCCUPATION	CROP PLANTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	SOWING AND SEEDLING RAISING	**DUTY NO.**	601
TASK TITLE	PLUG SEEDLING	**TASK NO.**	6016
PERFORMANCE CRITERIA	The person performing this task must be able to raise seedlings in accordance with crop types and planting requirements.		
RANGE STATEMENT	The task can be performed in the production farm under the supervision of senior technicians or crop planting engineers. The tools and equipment to be used include: 1. Walking sprinklers; 2. Seedbeds.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select appropriate tools and equipment; 2. Operate walking sprinklers; 3. Regulate the environmental conditions of the seedbed microclimate; 4. Control diseases and insect pests during the seedling stage; 5. Clean the tools, equipment and workplaces; 6. Safely arrange and store the tools and equipment.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Operate walking sprinklers; 1.2 Regulate environmental conditions in nursery sites; 1.3 Control diseases and insect pests during the seedling stage. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Plug seedling principles; 2.2 Parameters of environmental factors for seedling raising. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Plug seedling process; 3.2 Technical standards for plug seedling; 3.3 Requirements for environmental conditions at different growth stages of seedlings; 3.4 Diagnosis and control methods for diseases and insect pests during the seedling stage. **4.0 Essential Skills** 4.1 DIY ability; 4.2 Teamwork skills; 4.3 Computational and data analysis skills; 4.4 Report writing ability;

	4.5 Communication and expression skills; 4.6 Problem analysis and solving skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Plug seedling is performed in accordance with crop types and planting requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Safety operation of equipment.

OCCUPATION	CROP PLANTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	ASEXUAL PROPAGATION OF CROPS	**DUTY NO.**	602
TASK TITLE	CUTTAGE PROPAGATION	**TASK NO.**	6021
PERFORMANCE CRITERIA	The person performing this task must be able to raise seedlings by cuttage in accordance with crop types and planting requirements.		
RANGE STATEMENT	The task can be performed in the production farm under the supervision of senior technicians or crop planting engineers. The tools and equipment to be used include: 1. Pruning shears; 2. Shovels; 3. Mulching films; 4. Cuttage seedbeds.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select appropriate tools and equipment; 2. Select suitable plants for cuttage propagation; 3. Collect cutting slips; 4. Store cutting slips; 5. Choose the time of cuttage propagation; 6. Choose mechanical treatment, etiolation treatment, cleaning treatment, pharmaceutical treatment, heating treatment and other suitable methods to promote the rooting rate of cuttings; 7. Conduct cuttage propagation; 8. Clean the tools, equipment and workplaces; 9. Safely arrange and store the tools and equipment.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Select the mother tree; 1.2 Collect cutting slips; 1.3 Store cutting slips; 1.4 Promote the rooting rate of cuttings; 1.5 Raise seedlings by cuttage. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Concepts of cuttage propagation; 2.2 Principles of rooting cuttage. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Time selection for cutting slip collection; 3.2 Cuttage propagation process; 3.3 Factors affecting the survival of cuttings; 3.4 Mulching film requirements and precautions; 3.5 Types of crops suitable for cuttage propagation and their characteristics; 3.6 Types of facilities and substrates commonly used for cuttage. **4.0 Essential Skills**

	4.1 DIY ability; 4.2 Teamwork skills; 4.3 Computational and data analysis skills; 4.4 Report writing ability; 4.5 Communication and expression skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Cuttage propagation of crops is conducted in accordance with crop types and planting requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Safety operation of equipment.

OCCUPATION	CROP PLANTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	ASEXUAL PROPAGATION OF CROPS	**DUTY NO.**	602
TASK TITLE	LAYERING PROPAGATION	**TASK NO.**	6022
PERFORMANCE CRITERIA	The person performing this task must be able to conduct layering propagation in accordance with crop types and planting requirements.		
RANGE STATEMENT	The task can be performed in the production farm under the supervision of senior technicians or crop planting engineers. The tools and equipment to be used include: 1. Pruning shears; 2. Shovels.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select appropriate tools and equipment; 2. Select mother plants suitable for layering propagation; 3. Choose the correct period for layerage; 4. Carry out layering propagation; 5. Clean the tools, equipment and workplaces; 6. Safely arrange and store the tools and equipment.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Promote the rooting rate of layerage; 1.2 Select crops suitable for layering propagation; 1.3 Select the appropriate period for layering propagation. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Concepts of layering propagation; 2.2 Principles of layerage rooting. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Layering propagation process; 3.2 Advantages and disadvantages of layering propagation; 3.3 Factors affecting the layerage survival; 3.4 Types of crops suitable for layering propagation and their characteristics. **4.0 Essential Skills** 4.1 DIY ability; 4.2 Teamwork skills; 4.3 Computational and data analysis skills; 4.4 Report writing ability; 4.5 Communication and expression skills.

DESCRIPTION OF THE END PRODUCT / SERVICE	Layering propagation of crops is carried out in accordance with crop types and planting requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Safety operation of equipment.

OCCUPATION	CROP PLANTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	ASEXUAL PROPAGATION OF CROPS	**DUTY NO.**	602
TASK TITLE	DIVISION PROPAGATION	**TASK NO.**	6023
PERFORMANCE CRITERIA	The person performing this task must be able to conduct division propagation in accordance with crop types and planting requirements.		
RANGE STATEMENT	The task can be performed in the production farm under the supervision of senior technicians or crop planting engineers. The tools and equipment to be used include: 1. Pruning shears; 2. Shovels.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select appropriate tools and equipment; 2. Select suitable crops for division propagation; 3. Choose the right period for division propagation; 4. Choose the correct division method for propagation; 5. Clean the tools, equipment and workplaces; 6. Safely arrange and store the tools and equipment.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Choose crop species suitable for division propagation; 1.2 Select a suitable period for division propagation; 1.3 Perform division propagation. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Concepts of division propagation; 2.2 Basic principles of division propagation. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Division propagation process; 3.2 Advantages and disadvantages of division propagation; 3.3 Types of crops suitable for division propagation and their characteristics; **4.0 Essential Skills** 4.1 DIY ability; 4.2 Teamwork skills; 4.3 Computational and data analysis skills; 4.4 Report writing ability; 4.5 Communication and expression skills.

DESCRIPTION OF THE END PRODUCT / SERVICE	Division propagation is conducted in accordance with crop types and planting requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Safety operation of equipment.

OCCUPATION	CROP PLANTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	SEEDLING TRANSPLANTING (FIELD PLANTING)	**DUTY NO.**	603
TASK TITLE	DETERMINATION OF FIELD PLANTING DENSITY	**TASK NO.**	6031
PERFORMANCE CRITERIA	The person performing this task must be able to determine planting density in accordance with crop types and planting requirements.		
RANGE STATEMENT	The task can be performed in the production site under the supervision of crop planting engineers. The tools and equipment to be used include: 1. Tapelines; 2. Marking tools such as white ashes, bamboo poles or wooden sticks.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select appropriate tools and equipment; 2. Determine plant spacing; 3. Mark out field planting locations with rulers and marking tools; 4. Clean the tools, equipment and workplaces; 5. Safely arrange and store the tools and equipment.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Determine the field planting density of different crops; 1.2 Determine the row spacing for field planting. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of rational close planting of crops; 2.2 Field planting density of different crops. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Advantages and disadvantages of ridge planting and border planting; 3.2 Effects of field planting density on crop growth; 3.3 Growth habits of different crops; 3.4 Relationship between field planting density and yield. **4.0 Essential Skills** 4.1 DIY ability; 4.2 Teamwork skills; 4.3 Computational and data analysis skills; 4.4 Report writing ability; 4.5 Communication and expression skills.

DESCRIPTION OF THE END PRODUCT / SERVICE	Field planting density is determined in accordance with crop types and planting requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Safety operation of equipment.

OCCUPATION	CROP PLANTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	SEEDLING TRANSPLANTING (FIELD PLANTING)	**DUTY NO.**	603
TASK TITLE	FIELD PLANTING OF SEEDLINGS	**TASK NO.**	6032
PERFORMANCE CRITERIA	The person performing this task must be able to conduct the field planting of seedlings in accordance with crop types and planting requirements.		
RANGE STATEMENT	The task can be performed in the production site under the supervision of crop planting engineers. The tools and equipment to be used include: 1. Age-appropriate and strong seedlings; 2. Transplanting tools such as transplanting shovels and transplanters.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select appropriate tools and equipment; 2. Apply whole-ground base fertilizers; 3. Determine the period and time of field planting; 4. Determine the depth of field planting; 5. Use tools for field planting; 6. Clean the tools, equipment and workplaces; 7. Safely arrange and store the tools and equipment.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Apply whole-ground base fertilizers; 1.2 Select age-appropriate and strong seedlings; 1.3 Determine the field planting period, time and depth; 1.4 Choose the method of field planting. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles for determining age-appropriate strong seedlings and appropriate field planting period; 2.2 Principles for determining the field planting depth of different crops. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Effects of strong seedlings on crop growth; 3.2 Effects of field planting depth on crop growth; 3.3 Root system characteristics of different crops; 3.4 Characterization of different soil types; 3.5 Advantages and disadvantages of different ways of preparing the whole-ground for borders. **4.0 Essential Skills** 4.1 DIY ability; 4.2 Teamwork skills;

	4.3 Computational and data analysis skills; 4.4 Report writing ability; 4.5 Communication and expression skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Field planting of seedlings is accomplished in accordance with crop types and planting requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Safety operation of equipment.

OCCUPATION	CROP PLANTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	SEEDLING TRANSPLANTING (FIELD PLANTING)	**DUTY NO.**	603
TASK TITLE	MANAGEMENT OF SEEDLINGS AFTER FIELD PLANTING	**TASK NO.**	6033
PERFORMANCE CRITERIA	The person performing this task must be able to manage seedlings during field planting in accordance with crop types and planting requirements.		
RANGE STATEMENT	The task can be performed in the production site under the supervision of crop planting engineers. The tools and equipment to be used include: 1. Drip irrigation systems such as drip tubing and venturi fertilizer applicators; 2. Transplanting shovels, spades and other commonly-used farm implements.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select appropriate tools and equipment; 2. Determine when and how much to water; 3. Check and replenish seedlings; 4. Clean the tools, equipment and workplaces; 5. Safely arrange and store the tools and equipment.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Increase seedling survival; 1.2 Observe the growth status of seedlings; 1.3 Check and replenish seedlings. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of seedling transplant survival; 2.2 Water demand characteristics of crops during the seedling stage. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Environmental conditions required for crop retardation; 3.2 Growth habits of different crops. **4.0 Essential Skills** 4.1 DIY ability; 4.2 Teamwork skills; 4.3 Computational and data analysis skills; 4.4 Report writing ability; 4.5 Communication and expression skills;

	4.6 Installation and use of drip irrigation system skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The survival rate of over 95% for field planting of seedlings of is reached in accordance with crop types and planting requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Safety operation of equipment.

OCCUPATION	CROP PLANTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	WATER AND FERTILIZER MANAGEMENT DURING CROP GROWTH PERIOD	**DUTY NO.**	604
TASK TITLE	WATERING	**TASK NO.**	6041
PERFORMANCE CRITERIA	The person performing this task must be able to manage the watering of crops in accordance with crop types and planting requirements.		
RANGE STATEMENT	The task can be performed in the production site under the supervision of crop planting engineers. The tools and equipment to be used include: 1. Water supply; 2. Water pumps; 3. Watering pipes; 4. Drip irrigation equipment such as drip tubing and venturi fertilizer applicators.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select appropriate tools and equipment; 2. Determine when, how and how much to water; 3. Properly install and use the drip irrigation equipment; 4. Clean the tools, equipment and workplaces; 5. Safely arrange and store the tools and equipment.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Determine when and how to water; 1.2 Determine the amount of watering in accordance with crops and growing periods; 1.3 Install and use drip irrigation equipment. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of water requirements for crops; 2.2 Principles of using water-saving irrigation equipment. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Types and components of water-saving irrigation equipment; 3.2 Water demand patterns of different crops; 3.3 Principles of water and fertilizer integration and application methods. **4.0 Essential Skills** 4.1 DIY ability;

	4.2 Teamwork skills; 4.3 Computational and data analysis skills; 4.4 Report writing ability; 4.5 Communication and expression skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Crops are watered appropriately at the right time in accordance with crop types and planting requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Safety operation of equipment.

OCCUPATION	CROP PLANTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	WATER AND FERTILIZER MANAGEMENT DURING CROP GROWTH PERIOD	**DUTY NO.**	604
TASK TITLE	TOPDRESSING	**TASK NO.**	6042
PERFORMANCE CRITERIA	The person performing this task must be able to manage the fertilization of crops in accordance with crop types and planting requirements.		
RANGE STATEMENT	The task can be performed in the production site under the supervision of crop planting engineers. The tools and equipment to be used include: 1. Fertilizers; 2. Solid fertilizer applicators and venturi fertilizer applicators.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select appropriate tools and equipment; 2. Determine the type, amount and period of fertilization; 3. Choose the appropriate method of fertilization (spreading, burrowing, striping, or flushing); 4. Apply fertilizers with fertilizer applicators; 5. Clean the tools, equipment and workplaces; 6. Safely arrange and store the tools and equipment.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Determine the type and amount of fertilization; 1.2 Determine the period and method of fertilization. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Fertilization patterns of crops; 2.2 Principles of formula fertilization. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Types and functions of fertilizers; 3.2 Nutritional requirements of crops; 3.3 Types of commonly-used fertilizers and their effectiveness; 3.4 Manifestations of crop deficiencies. **4.0 Essential Skills** 4.1 DIY ability; 4.2 Teamwork skills; 4.3 Computational and data analysis skills; 4.4 Report writing ability; 4.5 Communication and expression skills.

DESCRIPTION OF THE END PRODUCT / SERVICE	Fertilizer management is conducted in accordance with crop types and planting requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Safety operation of equipment.

OCCUPATION	CROP PLANTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	DIAGNOSIS AND CONTROL OF COMMON CROP DISEASES AND INSECT PESTS	**DUTY NO.**	605
TASK TITLE	DIAGNOSIS OF COMMON CROP DISEASES	**TASK NO.**	6051
PERFORMANCE CRITERIA	The person performing this task must be able to diagnose common disease types based on crop symptoms and pathogen morphological characteristics.		
RANGE STATEMENT	The task can be performed in the field and laboratory under the supervision of senior technicians or plant physicians. The tools and equipment to be used include: 1. Magnifiers; 2. Optical microscopes; 3. Constant temperature incubators; 4. Clean benches; 5. Autoclaves; 6. Specimen holders.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select appropriate tools and equipment; 2. Observe the distribution and severity of crop diseases; 3. Observe the symptomatic characteristics of crop diseases; 4. Ask about the recent weather and the use of pesticides and fertilizers; 5. Collect fresh crop disease samples; 6. Perform microscopic observation and pathogen culture; 7. Clean the tools, equipment and workplaces; 8. Safely arrange and store the tools and equipment.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Diagnose diseases caused by biotic pathogens and those caused by abiotic pathogens; 1.2 Diagnose diseases caused by phytopathogenic bacteria; 1.3 Diagnose diseases caused by phytopathogenic prokaryotes; 1.4 Diagnose diseases caused by plant viruses; 1.5 Diagnose diseases caused by phytopathogenic nematodes; 1.6 Diagnose diseases caused by parasitic seed plants. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Koch postulates; 2.2 Patterns of occurrence and prevalence of plant diseases. **3.0 Theories** The person performing this task must be able to explain the following:

	3.1 Concept of biotic pathogens; 3.2 Concept of abiotic pathogens; 3.3 Characterization of the pathogenesis of different pathogens; 3.4 Characterization of abiotic diseases and diagnostic methods; 3.5 Infestation cycles of plant diseases. **4.0 Essential Skills** 4.1 DIY ability; 4.2 Teamwork skills; 4.3 Computational and data analysis skills; 4.4 Report writing ability; 4.5 Communication and expression skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Common crop diseases are correctly diagnosed in accordance with crop disease diagnostic techniques.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Safety operation of equipment.

OCCUPATION	CROP PLANTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	DIAGNOSIS AND CONTROL OF COMMON CROP DISEASES AND INSECT PESTS	**DUTY NO.**	605
TASK TITLE	IDENTIFICATION OF COMMON CROP PESTS	**TASK NO.**	6052
PERFORMANCE CRITERIA	The person performing this task must be able to identify common crop pests in accordance with their infestation characteristics and morphological characteristics.		
RANGE STATEMENT	The task can be performed in the field and laboratory under the supervision of senior technicians or plant physicians. The tools and equipment to be used include: 1. Magnifiers; 2. Stereo microscopes; 3. Sweep nets; 4. Insect cages.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select appropriate tools and equipment; 2. Observe the pest's infestation host range; 3. Observe the characteristics of pest infestation; 4. Observe the external morphological characteristics of the pest (mainly the mouthparts and wings); 5. Observe the biological characteristics of the pest; 6. Clean the tools, equipment and workplaces; 7. Safely arrange and store the tools and equipment.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Determine the pest type by analyzing the host type; 1.2 Determine the pest type by analyzing the characteristics of its infestation; 1.3 Determine the pest type by analyzing the external morphological characteristics; 1.4 Determine the pest type by analyzing the biological characteristics. **2.0 Principles** The person performing this task must be able to explain the following: 2.1 Classification of agricultural insects; 2.2 Methods of taxonomic identification of insects. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 External morphological characteristics of insects; 3.2 Biological characteristics of insects; 3.3 Usage of insects. **4.0 Essential Skills**

	4.1 DIY ability; 4.2 Teamwork skills; 4.3 Computational and data analysis skills; 4.4 Report writing ability; 4.5 Communication and expression skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Common crop pests are correctly diagnosed in accordance with plant pest diagnostic techniques.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Safety operation of equipment.

OCCUPATION	CROP PLANTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	DIAGNOSIS AND CONTROL OF COMMON CROP DISEASES AND INSECT PESTS	**DUTY NO.**	605
TASK TITLE	CROP DISEASE CONTROL	**TASK NO.**	6053
PERFORMANCE CRITERIA	The person performing this task must be able to carry out the integrated management of crop diseases in accordance with their occurrence.		
RANGE STATEMENT	The task can be performed in the field under the supervision of senior technicians, plant physicians or pharmacists. The tools and equipment to be used include: 1. Sprayers; 2. Measuring cylinders; 3. Electronic scales.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select appropriate tools and equipment; 2. Adopt green control measures (agricultural, biological and physical control); 3. Apply chemical control in a scientific manner; 4. Clean the tools, equipment and workplaces; 5. Safely arrange and store the tools and equipment.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Analyze crop pathogen species to determine control methods; 1.2 Analyze the crop disease occurrence regularity to determine control measures; 1.3 Apply green control measures; 1.4 Prepare and apply pesticides. **2.0 Principles** The person performing this task must be able to explain the following: 2.1 Disease triangle; 2.2 Integrated Pest Management (IPM) approach to plant protection. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Integrated approach to crop disease control; 3.2 Process of crop disease infestation; 3.3 Conditions for crop diseases. **4.0 Essential Skills** 4.1 DIY ability; 4.2 Teamwork skills; 4.3 Computational and data analysis skills;

	4.4 Report writing ability; 4.5 Communication and expression skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Integrated control is carried out in accordance with the occurrence of diseases.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Safe use of pesticides.

OCCUPATION	CROP PLANTING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	DIAGNOSIS AND CONTROL OF COMMON CROP DISEASES AND INSECT PESTS	**DUTY NO.**	605
TASK TITLE	CROP INSECT PEST CONTROL	**TASK NO.**	6054
PERFORMANCE CRITERIA	The person performing this task must be able to carry out the integrated management of crop insect pests in accordance with their occurrence.		
RANGE STATEMENT	The task can be performed in the field under the supervision of senior technicians, plant physicians or pharmacists. The tools and equipment to be used include: 1. Sprayers; 2. Measuring cylinders; 3. Electronic scales; 4. Yellow boards.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select appropriate tools and equipment; 2. Adopt green control measures (agricultural, biological and physical control); 3. Apply chemical control in a scientific manner; 4. Clean the tools, equipment and workplaces; 5. Safely arrange and store the tools and equipment.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Analyze infestation characteristics of crop pests to determine control methods; 1.2 Analyze the crop pest occurrence regularity to determine control methods; 1.3 Apply green control measures; 1.4 Prepare and apply pesticides. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Integrated Pest Management (IPM) approach to plant protection; 2.2 Types of mouthparts of crop pests. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Integrated approach to crop pest control; 3.2 Characterization of crop pest infestation; 3.3 Occurrence regularity of insect pests. **4.0 Essential Skills** 4.1 DIY ability; 4.2 Teamwork skills;

	4.3 Computational and data analysis skills; 4.4 Report writing ability; 4.5 Communication and expression skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Integrated prevention and control plan is prepared in accordance with the occurrence of diseases.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Safe use of pesticides.

TABLE 1: DACUM CHARTS FOR CROP PLANTING TECHNICIAN - NTA 6

DUTIES	TASKS	ENABLERS
1.0 Sowing and seedling raising	1.1 Pretreatment for sowing. 1.2 Production of seedbeds. 1.3 Seedbed seedling raising. 1.4 Preparation of substrates. 1.5 Plug sowing. 1.6 Plug seedling.	**General skills and knowledge** · Conditions for seed germination · Seed disinfection and pretreatment for sowing · Common sowing methods · Characterization of growth and development of crops during the seedling stage · Crop field livestreaming skills · Conventional crop seedling raising technology · Crop plug seedling technology · Disease and insect pest control during the seedling stage **Tools and equipment** · Rotary cultivators · Harrow machines · Substrate mixers · Automatic precision seeders · Germination acceleration rooms · Walking sprinklers · Seedbeds and commonly-used farm implements **Materials** · Plug trays, substrates, disinfectants, fertilizers, seeds, etc. **Requirements for employees** · Teamwork spirit · Safety consciousness · Environment protection awareness · Lifelong learning skills
2.0 Asexual propagation of crops	2.1 Cuttage propagation. 2.2 Layering propagation. 2.3 Division propagation.	**General skills and knowledge** · Concepts of various methods of asexual propagation of crops · Advantages and disadvantages of various methods of asexual propagation of crops · Plants suitable for various methods of asexual propagation of crops

DUTIES	TASKS	ENABLERS
		· Principles of survival of various methods of asexual propagation of crops · Cuttage propagation of crops · Layering propagation of crops · Division propagation of crops **Tools and equipment** · Pruning shears · Shovels and other farm implements · Seedling raising seedbeds **Materials** · Mother plants of crops to be bred · Rooting agents, mulching films, etc. **Requirements for employees** · Teamwork spirit · Safety consciousness · Environment protection awareness · Lifelong learning skills
3.0 Seedling transplanting (field planting)	3.1 Determination of field planting density. 3.2 Field planting of seedlings. 3.3 Management of seedlings during field planting.	**General skills and knowledge** · Principles of rational close planting · Land preparation for different crops · Types and amounts of basal fertilizers · Age-appropriate seedling characteristics · Determination of time, depth and method for field planting · Management of seedlings after field planting · Check and replenish seedlings **Tools and equipment** · Tapelines · Marking tools · Transplanting shovels · Pickaxes · Drip irrigation system **Materials** · Seedling of appropriate age · Fertilizers

DUTIES	TASKS	ENABLERS
		Requirements for employees · Teamwork spirit · Safety consciousness · Environment protection awareness · Lifelong learning skills
4.0 Water and fertilizer management during crop growth period	4.1 Watering. 4.2 Fertilization.	**General skills and knowledge** · Water demand patterns of crops · Fertilization patterns of crops · Commonly-used watering methods · Commonly-used fertilization methods · Installation and application of water-saving irrigation and fertilization equipment · Topdressing and watering of crops in accordance with growth and development characteristics · Effects of different nutrients on crop growth and development **Tools and equipment** · Fertilization and irrigation tools · Water-saving irrigation equipment · Fertilizer applicators **Materials** · Fertilizers **Requirements for employees** · Teamwork spirit · Safety consciousness · Environment protection awareness · Lifelong learning skills
5.0 DIAGNOSIS AND CONTROL OF COMMON CROP DISEASES AND INSECT PESTS	5.1 Diagnosis of common crop diseases. 5.2 Identification of common crop pests. 5.3 Crop disease control. 5.4 Crop insect pest control.	**General skills and knowledge** · Diagnostic methods for biotic diseases · Diagnostic methods for abiotic diseases · Microscopic diagnosis of crop diseases · Isolation, purification and culture of crop diseases

DUTIES	TASKS	ENABLERS
		· Five major groups of biotic pathogens of crops · Types of abiotic pathogens of crops · Infestation cycles of crop diseases · External morphological characteristics of insects · Classification of insects · Modes of insect reproduction · Insect habits · Insect development · Integrated prevention and control plan for crop diseases and insect pests **Tools and equipment** · Magnifiers · Optical microscopes · Specimen holders · Constant temperature incubators · Clean benches · Autoclaves · Stereo microscopes · Sweep nets · Insect cages · Sprayers **Materials** · Cover slides · Glass slides · Sulphate paper **Requirements for employees** · Teamwork spirit · Safety consciousness · Environment protection awareness · Lifelong learning skills