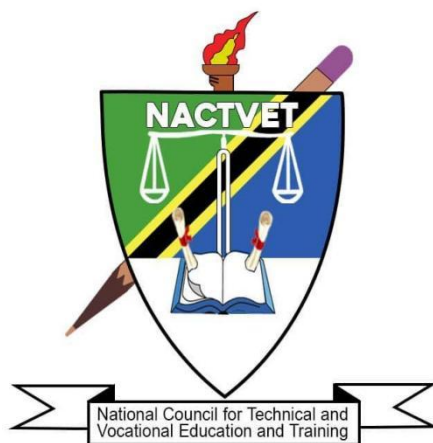


**NATIONAL COUNCIL FOR TECHNICAL AND VOCATIONAL EDUCATION AND
TRAINING**



APRIL 2023

PROPOSED OCCUPATIONAL STANDARDS

OCCUPATION: CROP PLANTING ENGINEER

LEVEL: NTA 8

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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: baker)
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 Engineer occupation 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 Engineers 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 3 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 20 participants from different parts of the country representing various companies.

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

These standards cover a broad range of duties and tasks that can be performed by a Crop Planting Engineer. 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 Engineer 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 Engineer manages production operations and long term planning for the entire plantation area. Production and operation management includes production technology guidance, operation management and human resources deployment, while long-term planning includes the introduction of new varieties, new technologies and environmentally friendly production. For sustainable agricultural development, crop planting engineers need to organise and guide agricultural technicians to investigate the occurrence of soil and crop diseases and insect pests in plantation areas, formulate scientific fertilization schedule and plant protection programmes, treat all kinds of agricultural wastes in a harmless manner, design and implement agricultural scientific experiments, and screen out new varieties and technologies suitable for local production through the experiments. Finally, these scientific results are disseminated to other plantation areas through project demonstrations and farmer training. Generally, the Crop Planting Engineer performs the following responsibilities:

- a) Plantation area production programme development
- b) Application of cultivation facilities
- c) Soilless cultivation of vegetables
- d) Selection and breeding of crop varieties
- e) Breeding of improved crop varieties
- f) Application of agricultural machinery
- g) Harvesting and post-harvest handling of agricultural products
- h) Plant tissue culture and rapid breeding
- i) Agricultural Marketing
- j) Soil analysis of plantation areas and development of fertilization schedules
- k) Plant protection programme development in the plantation area
- l) Design and implementation of agricultural science experiments
- m) Harmless treatment of agricultural waste
- n) Applications of agricultural IoT

- o) Programme development of agricultural technology extension
- p) Operation and management in plantation areas
- q) Human resources management for plantation areas

The Occupational Standards have been clustered into NTA qualification levels, i.e. NTA level 7 and 8.

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 ENGINEER - NTA 8

OCCUPATION	CROP PLANTING ENGINEER	OCCUPATION CODE	
DUTY TITLE	SOIL ANALYSIS OF PLANTATION AREAS AND DEVELOPMENT OF FERTILIZATION SCHEDULES	DUTY NO.	801
TASK TITLE	DETERMINATION OF SOIL FAST-ACTING NUTRIENTS AND DATA ANALYSIS	TASK NO.	8011
PERFORMANCE CRITERIA	The person performing this task must conduct soil nutrient determination operations in accordance with the soil testing and formulation requirements, and propose a rational fertilization schedule or recommendation through the soil test report.		
RANGE STATEMENT	The task can be performed in soil fertilizer laboratories and crop production fields under the supervision of crop planting engineers. The tools and equipment to be used include: 1. Crop production fields; 2. Earth augers, spades, shovels, cutting rings; 3. Soil sieves, grinding bowls; 4. Wide-mouthed bottles, thin-mouthed bottles; 5. Soil nutrient analytical instruments such as thermostats, oscillators, analytical balances, sterilizers, spectrophotometers, flame photometers, pH meters, conductivity meters; 6. Test tubes, sterilizers, diffusion dishes, conical bottles, volumetric flasks, funnels, beakers and other glass instruments; 7. Test consumables such as pH wide-range test paper, qualitative filter paper, and label tags; 8. Test drugs such as ferrous sulfate, potassium chloride and concentrated sulphuric acid.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Select the correct soil sample collection route; 2. Collect and prepare loam samples; 3. Determine the soil alkaline dissolved nitrogen content; 4. Determine the soil fast-acting phosphorus content; 5. Determine the soil fast-acting potassium content; 6. Determine the soil organic matter content;		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Select a soil sample collection route; 1.2 Collect soil samples; 1.3 Determine soil nutrients; 1.4 Analyse the measurement data. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Principles of soil nutrient determination; 2.2 Principles of soil nutrient data analysis.	

7. Determine soil pH; 8. Determine the soil water-soluble neutral salt content; 9. Analyse soil nutrient data analysis and write soil nutrient reports; 10. Clean the tools, equipment and workplaces; 11. Standardize the storage of operating tools and equipment.	3.0 Theories The person performing this task must be able to explain the following: 3.1 The principle for conducting soil nutrient data analysis; 3.2 The standard for conducting soil nutrient data analysis; 3.3 Geographical environment and climate of the plantation; 3.4 Local government rules and regulations regarding the use of farmland; 3.5 Fertilization pattern of crops; 3.6 Soil physicochemical properties and characteristics. 4.0 Essential Skills 4.1 Logical analysis ability; 4.2 DIY ability; 4.3 Teamwork skills; 4.4 Data analysis competence; 4.5 Report writing skills; 4.6 The ability to connect theory with practice; 4.7 Communication and exchange skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Soil nutrient reports are written following soil nutrient determinations in accordance with target yield requirements for crop production fields.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Occupational health and safety; 2. Safety operation of equipment.

OCCUPATION	CROP PLANTING ENGINEER	OCCUPATION CODE	
DUTY TITLE	SOIL ANALYSIS OF PLANTATION AREAS AND DEVELOPMENT OF FERTILIZATION SCHEDULES	DUTY NO.	801
TASK TITLE	DEVELOPMENT OF PSCMF SCHEDULE	TASK NO.	8012
PERFORMANCE CRITERIA	The person performing this task must be able to select suitable organic and inorganic fertilizers, calculate the appropriate dosage, and formulate a professional fertilization schedule for crops in accordance with the Fertilization pattern of the crop and the soil nutrient analysis report.		
RANGE STATEMENT	The task can be performed in crop planting trial plots under the supervision of crop planting engineers. The tools and equipment to be used include: 1. Test record book; 2. Test recorder pen; 3. Organic fertilizers such as chicken manure and pig manure; 4. Inorganic fertilizers such as urea, calcium superphosphate and potassium chloride; 5. Plant special composite mixing fertilizer (PSCMF); 6. Computers.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Calculate the fertilizer requirement for each type of crop; 2. Calculate the ratio of nitrogen, phosphorus and potassium for specialized fertilizers; 3. Determine the type of fertilizer; 4. Determine fertilizer ratios; 5. Prepare PSCMF; 6. Determine the period of fertilization; 7. Determine the method of fertilization; 8. Clean the tools, equipment and workplaces; 9. Standardize the storage of operating tools and equipment.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Develop a programme of nutrient ratios for PSCMF; 1.2 Screen organic and inorganic fertilizers; 1.3 Mix different fertilizers. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Fertilization pattern of crops; 2.2 Principle of crop fertilization. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Concept of PSCMF; 3.2 Scientific rationing of PSCMF; 3.3 Methods of PSCMF application; 3.4 Geographical environment and climate of the plantation; 3.5 Crop planting technology;	

	3.6 Local government regulations on fertilization. 4.0 Essential Skills 4.1 Logical analysis ability; 4.2 Data statistics skills; 4.3 Teamwork skills; 4.4 Communication and exchange skills; 4.5 Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	PSCMF fertilization schedule is proposed in accordance with the fertilization pattern of crops and the soil's ability to supply fertilizer.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Occupational health and safety; 2. Safety operation of equipment.

OCCUPATION	CROP PLANTING ENGINEER	OCCUPATION CODE	
DUTY TITLE	PLANT PROTECTION PROGRAMME DEVELOPMENT IN THE PLANTATION AREA	DUTY NO.	802
TASK TITLE	CROP DISEASES AND INSECT PESTS PREDICTION AND FORECASTING	TASK NO.	8021
PERFORMANCE CRITERIA	The person performing this task must be able to forecast diseases and insect pest in accordance with crop diseases and insect pests control requirements.		
RANGE STATEMENT	The task can be performed in plantation areas under the supervision of crop planting engineers. The tools and equipment to be used include: 1. Ordinary biological microscopes; 2. Spore catchers; 3. Coverslips; 4. Glass slides; 5. Small weather stations; 6. Magnifiers; 7. Sweep nets; 8. Lures; 9. Tweezers; 10. Insect-cages.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Investigate the types of diseases and insect pest in the planting area in previous years; 2. Develop a forecasting program; 3. Investigate overwintering fungus and population base; 4. Predict and forecast the period and amount of diseases and insect pest that will occur in the planting area.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Investigate diseases and insect pest species; 1.2 Investigate overwintering fungus and population base; 1.3 Predict and forecast the diseases and insect pest of plants. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Principle of diseases and insect pests prediction and forecasting; 2.2 Occurrence regularity of plant insect pests. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Factors in the development of plant diseases; 3.2 Process of crop diseases infestation;	

	3.3 Infestation cycles of crop diseases; 3.4 Climate prediction method; 3.5 Forecast by emergence interval; 3.6 Environmental factors approach; 3.7 Pest base method; 3.8 Morphological indicator method; 3.9 Methods of microscopic diagnosis of plant disease pathogens; 3.10 Insect external morphological identification methods. 4.0 Essential Skills 4.1 Logical analysis ability; 4.2 Problem analysis skills; 4.3 The ability to connect theory with practice; 4.4 Communication and exchange skills; 4.5 Teamwork skills; 4.6 Reporting and writing skills; 4.7 Computer application skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The prediction and forecasting are prepared in accordance with the relevant programme for the type, period and amount of diseases and insect pests in the plantation area.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Occupational health and safety; 2. Safety operation of equipment.

OCCUPATION	CROP PLANTING ENGINEER	OCCUPATION CODE	
DUTY TITLE	PLANT PROTECTION PROGRAMME DEVELOPMENT IN THE PLANTATION AREA	DUTY NO.	802
TASK TITLE	DEVELOPMENT OF INTEGRATED PREVENTION AND CONTROL PLAN FOR CROP DISEASES AND INSECT PESTS	TASK NO.	8022
PERFORMANCE CRITERIA	The person performing this task must be able to develop integrated prevention and control plan for crop diseases and insect pests in accordance with IPM plant protection guidelines.		
RANGE STATEMENT	The task can be performed in plantation areas under the supervision of crop planting engineers. The tools and equipment to be used include: 1. Magnifiers; 2. Ordinary biological microscopes; 3. Coverslips; 4. Glass slides; 5. Measuring cups; 6. Scrapers; 7. Brushes; 8. Lures.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Investigate the types of diseases in the plantation area; 2. Investigate the species of pests in the plantation area; 3. Investigate the layout of crop cultivation in plantation areas; 4. Investigate the types of crops in the plantation area; 5. Investigate pre-existing preventive measures in plantation areas; 6. Investigate meteorological data in plantation areas; 7. Analyse the Investigation data and develop an integrated prevention and control plan in combination with the occurrence regularity of diseases and insect pests.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Investigate the occurrence of diseases and insect pest; 1.2 Investigate crop types and planting layouts; 1.3 Provide integrated prevention and control of plant diseases and insect pests. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Principle of crop diseases and insect pests occurrence regularity and control; 2.2 Integrated Pest Management (IPM) approach to plant protection. 2.3 Concept of economic thresholds. 3.0 Theories	

	The person performing this task must be able to explain the following: 3.1 Phytosanitary requirements; 3.2 Agro-integrated control methods; 3.3 Physical-mechanical control methods; 3.4 Biological control methods; 3.5 Chemical control methods; 3.6 Types of pesticides; 3.7 Basic knowledge of pesticide use; 3.8 Local government regulations on the safe use of pesticides. 4.0 Essential Skills 4.1 Logical analysis ability; 4.2 Teamwork skills; 4.3 Communication and exchange skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The integrated prevention and control plan of diseases and insect pest for plantation areas is developed in accordance with the crop species and diseases and insect pest occurrence regularity, under the guidance of the IPM plant protection guidelines.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Occupational health and safety; 2. Safety operation of equipment.

OCCUPATION	CROP PLANTING ENGINEER	OCCUPATION CODE	
DUTY TITLE	DESIGN AND IMPLEMENTATION OF AGRICULTURAL SCIENCE EXPERIMENTS	DUTY NO.	803
TASK TITLE	DESIGN AND IMPLEMENTATION OF SCIENTIFIC FIELD TRIALS	TASK NO.	8031
PERFORMANCE CRITERIA	The person performing this task must be able to design a field experiment programme in accordance with the requirements of the plantation area's production, such as the introduction of new varieties, and to carry out the trial correctly and scientifically.		
RANGE STATEMENT	The task can be performed in plantation areas under the supervision of crop planting engineers. The tools and equipment to be used include: 1. Computers with random number table, orthogonal experimental design table; 2. Land levelling test plots; 3. Fast-acting fertilizer; 4. Subdivision signages; 5. Steel tapes and tape measures; 6. Seeds, seedlings and other test materials; 7. Seeds or soil sanitizers; 8. Shovels, tractors, ridging and tilling machines and other supporting production tools; 9. Mulching films, fiberglass ropes, labelling tags and other test consumables; 10. Irrigation equipment such as drip and sprinkler irrigation.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Obtain the resources required for the task; 2. Analyse the test objectives and indicators in the plantation area; 3. Adopt the correct experimental design methods; 4. Design the pilot program; 5. Prepare the field experiment proposal; 6. Perform soil preparation operations; 7. Delineate and number the subdivisions; 8. Organise the process of trial		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Design and implement scientific field trials. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Design principles of field science experiments; 2.2 Sampling principles of field science experiments. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Completely randomized experimental design methods	

implementation such as planting and investigations; 9. Complete the daily management of the pilot area.	and applied methods; 3.2 Randomized block group experimental design methods and applied methods; 3.3 Principles of orthogonal experimental design methods and application methods; 3.4 Test methods for the efficacy of common crops; 3.5 Test methods for fertilizer efficiency in common crops; 3.6 Variety comparative test methods for common crops. 4.0 Essential Skills 4.1 Logical analysis ability; 4.2 Problem analysis and solving skills; 4.3 The ability to connect theory with practice; 4.4 Communication and exchange skills; 4.5 Teamwork skills; 4.6 Reporting and writing skills; 4.7 Computer application skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Field experiment programmes are prepared in accordance with the requirements of plantation area production or the introduction of new technologies and varieties, and scientific trials will be conducted properly.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Occupational health and safety; 2. Safety operation of equipment.

OCCUPATION	CROP PLANTING ENGINEER	OCCUPATION CODE	
DUTY TITLE	DESIGN AND IMPLEMENTATION OF AGRICULTURAL SCIENCE EXPERIMENTS	DUTY NO.	803
TASK TITLE	TEST DATA INVESTIGATION AND ANALYSIS	TASK NO.	8032
PERFORMANCE CRITERIA	The person performing this task must be able to investigate, organise, and analyse test data and obtain correct conclusions in accordance with the requirements of the field experiment design scheme.		
RANGE STATEMENT	The task can be performed in the plantation area under the supervision of crop planting engineers. The tools and equipment to be used include: 1. Test record books; 2. Test recorder pens; 3. Steel tapes, tape measures, vernier calipers balances and other test indicator determination tools; 4. Instruments and laboratories for the determination of indicators of physiological and biochemical tests of crops; 5. Computers equipped with Windows 2010 or higher levels; 6. Excel data analysis system, SPASS data analysis system.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Adhere to technical procedures for the scientific use of instruments; 2. Obtain the resources required for the task; 3. Determine crop test indicators; 4. Conduct data investigations; 5. Scientifically conduct test data collation; 6. Perform the ANOVA on common experimental designs with Excel software; 7. Perform the ANOVA on common experimental designs with SPSS software; 8. Determine the significance of each treatment; 9. Perform significance analysis; 10. Write the analysis report.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Conduct test data investigations; 1.2 Perform statistics and analysis of test data. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Principle for the determination of various test indicators; 2.2 Basic principle of ANOVA. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Measurements of plant morphological indicators such as common external test indicators; 3.2 Methods for determining sugar content, soluble solids, and other common plant physiological indicators.	

	4.0 Essential Skills 4.1 Logical analysis ability; 4.2 Ability to measure test indicators; 4.3 Mathematical statistics skills; 4.4 Software application skills; 4.5 Teamwork skills; 4.6 Report writing skills; 4.7 Communication and exchange skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Accurate experimental indicator data survey investigation and statistical analysis are conducted in accordance with the field experiment program.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Occupational health and safety.

OCCUPATION	CROP PLANTING ENGINEER	OCCUPATION CODE	
DUTY TITLE	DESIGN AND IMPLEMENTATION OF AGRICULTURAL SCIENCE EXPERIMENTS	DUTY NO.	803
TASK TITLE	PREPARATION OF EXPERIMENTAL SUMMARIES AND SCIENTIFIC PAPERS BASED ON EXPERIMENTAL RESULTS	TASK NO.	8033
PERFORMANCE CRITERIA	The person performing this task must be able to complete trial summaries and write scientific and technical papers until they are published, as required by the field experiment program.		
RANGE STATEMENT	The task can be performed in the office under the supervision of crop planting engineers. The tools and equipment to be used include: 1. Computers and reference books on experimental design and analysis; 2. Common mainstream literature retrieval tools; 3. Thesis writing software; 4. Thesis proofreading software.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Complete the trial background and trial significance including trial feasibility and necessity text writing; 2. Prepare experimental materials and test sites; 3. Write experimental design schemes, including test methods and experimental design; 4. Summarize the experimental result; 5. Summarize and discuss the findings of the trial, and look ahead to next steps; 6. Write literature material for reference applications; 7. Organise, refine and improve the trial summary; 8. Refine and revise articles and submit them for journals.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Write a summary of the experiment; 1.2 Write scientific and technical papers. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Basic requirements for writing agricultural science and technology articles and writing methods. 3.0 Theories The person performing this task must be able to explain the following: 3.1 The main contents and writing requirements of agricultural trial summaries; 3.2 The main contents and writing requirements of agricultural science and technology articles; 3.3 Scientific and technical paper title requirements; 3.4 Abstract and keyword requirements for scientific and technical papers; 3.5 Scientific and technical paper preface	

	requirements; 3.6 Requirements for writing references for scientific and technical papers. 4.0 Essential Skills 4.1 Writing ability; 4.2 Verbal expression skills; 4.3 Analytical and summarizing skills; 4.4 Computer application skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Trial summaries were completed in accordance with the requirements of the field experiment programme and scientific and technical papers are written for publish.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Occupational health and safety.

OCCUPATION	CROP PLANTING ENGINEER	OCCUPATION CODE	
DUTY TITLE	HARMLESS TREATMENT OF AGRICULTURAL WASTE	DUTY NO.	804
TASK TITLE	DEVELOPMENT AND ORGANIZATION OF THE IMPLEMENTATION OF RESOURCE UTILIZATION PROGRAMMES FOR LIVESTOCK AND POULTRY FECES	TASK NO.	8041
PERFORMANCE CRITERIA	The person performing this task must be able to formulate a resource utilization plan for livestock and poultry feces in accordance with the actual production, soil fertility, crop quality and other requirements and organise and implement it correctly and scientifically.		
RANGE STATEMENT	The task can be performed in plantation areas under the supervision of crop planting engineers. The tools and equipment to be used include: 1. Computers, programme writing tools / software; 2. Composting sites for livestock and poultry feces; 3. Livestock and poultry feces; 4. Soil temperature and humidity meters, EC value meters, PH value meters; 5. Compost humidification equipment; 6. Test specimens such as insecticides, decomposing agent and earthworms; 7. Inorganic fertilizers such as nitrogen, phosphorus and potassium; 8. Shovels, agricultural organic fertilizer mixers, turners and other supporting production tools; 9. Mulch, label tags and other consumables.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Develop an implementation plan for the resource-based treatment of livestock and poultry feces; 2. Organise and implement resource-based treatment of livestock and poultry feces; 3. Determine the nutrients of organic fertilizers from livestock and poultry feces; 4. Calculate the amount of organic fertilizer to be applied to livestock and poultry feces.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Design and carry out resource utilization of livestock and poultry feces; 1.2 Apply livestock and poultry feces. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Implications for livestock and poultry feces resource utilization; 2.2 Principle of livestock and poultry feces resource treatment.	

	3.0 Theories The person performing this task must be able to explain the following: 3.1 Operational methods for drying and treating livestock and poultry feces, deodorization techniques, and biological treatments; 3.2 Methods of organic fertilizer production from livestock and poultry feces; 3.3 Methods of utilizing livestock and poultry feces substrate cultivation; 3.4 Nutrient requirements of crops; 3.5 Nutrient content of different livestock and poultry feces; 3.6 Livestock and poultry feces substrate cultivation methods; 3.7 Local government regulations on livestock and poultry feces disposal. 4.0 Essential Skills 4.1 Problem analysis and solving skills; 4.2 The ability to connect theory with practice; 4.3 Communication and exchange skills; 4.4 Teamwork skills; 4.5 Reporting and writing skills; 4.6 Mechanical application skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The reasonable livestock and poultry feces resource utilization programme is proposed and organised in accordance with the production requirements of the plantation area.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Occupational health and safety.

OCCUPATION	CROP PLANTING ENGINEER	OCCUPATION CODE	
DUTY TITLE	HARMLESS TREATMENT OF AGRICULTURAL WASTE	DUTY NO.	804
TASK TITLE	DEVELOPMENT AND ORGANIZATION OF THE IMPLEMENTATION OF CROP STRAW FOR RESOURCE UTILIZATION PROGRAMMES	TASK NO.	8042
PERFORMANCE CRITERIA	The person performing this task must be able to develop and organise the implementation of programmes in accordance with the requirements for the purpose of resource utilization of crop straw.		
RANGE STATEMENT	The task can be performed in plantation areas under the supervision of crop planting engineers. The tools and equipment to be used include: 1. Computer, programme writing tool / software; 2. Straw disposal sites; 3. Crop straw; 4. Insecticides, straw rotting agents; 5. Inorganic fertilizers such as nitrogen, phosphorus and potassium; 6. Shovels, straw crushers, turners; 7. Flooding and humidifying equipment.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Develop the programme for fertilizing crop straw; 2. Organise and implement the fertilizer use of crop straw; 3. Determine fertilizer nutrients in crop straw; 4. Calculate the amount of crop straw fertilizer applied; 5. Develop the programme for the utilization of crop straw for feedstuff; 6. Organise and implement the utilization of crop straw for feedstuff.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Develop the programme for resource utilization of crop straw; 1.2 Organise and implement the utilization of straw resources. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Importance of resource utilization of crop straw; 2.2 Basic principle of resource utilization of crop straw; 3.0 Theories The person performing this task must be able to explain the following: 3.1 Straw fertilizer utilization methods and processes; 3.2 Straw feedstuff utilization methods and processes; 3.3 Technical requirements for the utilization of straw for energy, raw material and substrate;	

	3.4 Local government regulations on straw disposal. 4.0 Essential Skills 4.1 Logical analysis ability; 4.2 Teamwork skills; 4.3 Communication and exchange skills; 4.4 General programme design and writing skills; 4.5 Safe production competence.
DESCRIPTION OF THE END PRODUCT / SERVICE	The reasonable crop straw resource utilization programme is proposed in accordance with the actual needs of production.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Occupational health and safety.

OCCUPATION	CROP PLANTING ENGINEER	OCCUPATION CODE	
DUTY TITLE	HARMLESS TREATMENT OF AGRICULTURAL WASTE	DUTY NO.	804
TASK TITLE	DEVELOPMENT AND ORGANIZATION OF A PROGRAMME FOR THE DISPOSAL OF WASTE AGRICULTURAL FILMS	TASK NO.	8043
PERFORMANCE CRITERIA	The person performing this task must be able to complete the development and organise the implementation of the waste agricultural film disposal programme in accordance with the requirements of the overall field production program.		
RANGE STATEMENT	The task can be performed in plantation areas under the supervision of crop planting engineers. The tools and equipment to be used include: 1. Computer, programme writing tool / software; 2. Agricultural residual film recycling machine; 3. Agricultural tools; 4. Balers; 5. Transportation tools.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Develop a programme for the recycling and disposal of waste agricultural films and organise its implementation; 2. Develop a programme for the construction of recycling sites for waste agricultural films; 3. Establish a regulatory performance incentive mechanism for the disposal of waste agricultural films on farmland.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Recycle waste agricultural films; 1.2 Dispose of waste agricultural films. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Importance of recycling and disposal of waste agricultural shed films; 2.2 Principles of harmless treatment of waste agricultural films; 3.0 Theories The person performing this task must be able to explain the following: 3.1 Programme for the construction of recycling sites for waste agricultural films; 3.2 Precautions of recycling waste agricultural films; 3.3 Approaches to establishing regulatory performance incentives;	

	3.4 Types and properties of agricultural films; 3.5 Applications of agricultural films in production; 3.6 Waste agricultural film recycling uses; 3.7 Government regulations on the recycling of agricultural films. 4.0 Essential Skills 4.1 Plan writing skills; 4.2 Communication and exchange skills; 4.3 Logical analysis ability; 4.4 Teamwork skills; 4.5 Vision of overall situation.
DESCRIPTION OF THE END PRODUCT / SERVICE	The long-term mechanism for the recycling, processing and utilization of waste agricultural films is established in accordance with the requirements for the harmless treatment of waste agricultural films, with a view to promoting the green, circular and sustainable development of agriculture, completing the development of the programme and organising its concrete implementation.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Occupational health and safety.

OCCUPATION	CROP PLANTING ENGINEER	OCCUPATION CODE	
DUTY TITLE	APPLICATIONS OF AGRICULTURAL IOT	DUTY NO.	805
TASK TITLE	INTEGRATED DEPLOYMENT, DEBUGGING AND TROUBLESHOOTING OF IOT SOFTWARE AND HARDWARE EQUIPMENT FOR AGRICULTURE	TASK NO.	8051
PERFORMANCE CRITERIA	The person performing this task must be able to design, install, integrate, debug and troubleshoot agricultural IoT hardware and software equipment in accordance with the requirements for intelligent management of agricultural plantation areas.		
RANGE STATEMENT	The task can be performed in plantation areas under the supervision of crop planting engineers. The tools and equipment to be used include: 1. IoT monitoring terminals; 2. Router; 3. IoT gateway; 4. Wireless sensor; 5. WIFI or 4G/5G network; 6. Bluetooth, ZigBee application devices; 7. Data processing cloud platform.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Design agricultural IoT systems; 2. Select to install a wireless sensor; 3. Install the router and gateway; 4. Install WIFI or 4G/5G network; 5. Install data processing cloud platforms; 6. Install IoT monitoring terminals; 7. Install the agricultural IoT software; 8. Debug and troubleshoot agricultural IoT hardware and software systems.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Design agricultural IoT systems; 1.2 Integrate the installation and debugging of agricultural IoT systems. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Usage of agricultural IoT hardware and software equipment; 2.2 Basic principle of environmental regulation in the agricultural IoT. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Methods of operating an agricultural IoT hardware system;	

	3.2 Methods of operating an agricultural IoT software system; 4.0 Essential Skills 4.1 Logical analysis ability; 4.2 Problem analysis and solving skills; 4.3 The ability to connect theory with practice; 4.4 Communication and exchange skills; 4.5 Teamwork skills; 4.6 Computer application skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The supporting agricultural IoT system is selected, installed and debugged in accordance with the production requirements of the plantation area.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Occupational health and safety; 2. Maintenance operation processes and procedures.

OCCUPATION	CROP PLANTING ENGINEER	OCCUPATION CODE	
DUTY TITLE	APPLICATIONS OF AGRICULTURAL IOT	DUTY NO.	805
TASK TITLE	CONFIGURATION OF AGRICULTURAL IOT MANAGEMENT PARAMETERS UNDER ACTUAL SITUATIONS	TASK NO.	8052
PERFORMANCE CRITERIA	The person performing this task must be able to complete the parameters setup of the agricultural IoT in accordance with the requirements of the agricultural plantation area.		
RANGE STATEMENT	The task can be performed in plantation areas under the supervision of crop planting engineers. The tools and equipment to be used include: 1. IoT monitoring terminals; 2. Router; 3. IoT gateway; 4. Wireless sensor; 5. WIFI or 4G/5G network; 6. Bluetooth, ZigBee application devices; 7. Data processing cloud platforms; 8. Planting sites in the agricultural plantation area (facilities, fields and plant types).		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Select an agricultural IoT hardware equipment; 2. Select an agricultural IoT software equipment; 3. Select suitable wireless sensors; 4. Install the sensor; 5. Connect sensors, gateways, networks, IoT endpoints; 6. Set up agricultural IoT parameters; 7. Control agricultural IoT parameters; 8. Debug agricultural IoT hardware and software systems.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Set up agricultural IoT parameters. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Principles for setting agricultural IoT parameters corresponding to plant growth. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Common sensor selection criteria (light, temperature, humidity, gas, soil, etc.); 3.2 Parameter setting requirements for plant growth factors. 4.0 Essential Skills	

	4.1 Logical analysis ability; 4.2 Teamwork skills; 4.3 Communication and exchange skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Agricultural IoT parameters are regulated in real time in accordance with the production requirements in the plantation area.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Occupational health and safety; 2. Maintenance operation processes and procedures.

OCCUPATION	CROP PLANTING ENGINEER	OCCUPATION CODE	
DUTY TITLE	APPLICATIONS OF AGRICULTURAL IOT	DUTY NO.	805
TASK TITLE	MANAGEMENT OF AGRICULTURAL PRODUCTION BY IOT	TASK NO.	8053
PERFORMANCE CRITERIA	The person performing this task must rationalize the use of agricultural IoT equipment to assist in the management of agricultural plantation area production in accordance with Internet management standards.		
RANGE STATEMENT	The task can be performed in the workroom under the supervision of crop planting engineers. The tools and equipment to be used include: 1. IoT monitoring terminals; 2. Router; 3. IoT gateway; 4. Wireless sensor; 5. WIFI or 4G/5G network; 6. Bluetooth, ZigBee application devices; 7. Data processing cloud platforms; 8. Planting sites in the agricultural plantation area (greenhouses, crop parks, fruit tree parks and planting crops).		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Monitor and control the temperature of environmental factors in the greenhouse (temperature, humidity, light, soil, gas); 2. Monitor the field environment (wind direction, wind speed, rainfall); 3. Monitor the orchard environment; 4. Operate the IoT water and fertilizer integration systems; 5. Operate the early warning and forecasting systems for diseases and insect pest; 6. Apply agricultural navigation and plant protection UAVs; 7. Operate the traceability systems for the quality and safety of agricultural products.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Monitor and regulate the agricultural production environment by IoT; 1.2 Management of agricultural production by IoT. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Principles of monitoring and regulation of agro-environmental factors; 2.2 Principles of installation and use of agricultural IoT equipment. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Indicators for monitoring agro-environmental factors; 3.2 Application methods of agricultural IoT to assist	

	agricultural production in environmental regulation, water and fertilizer integration, diseases and insect pest early warning, navigation of agricultural machinery and safe traceability of agricultural products. 4.0 Essential Skills 4.1 Data analysis competence; 4.2 Computer application skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Agricultural environmental factor monitoring and regulation, agricultural production management and quality and safety traceability are carried out in accordance with the application of agricultural IoT systems.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Occupational health and safety; 2. Maintenance operation processes and procedures.

OCCUPATION	CROP PLANTING ENGINEER	OCCUPATION CODE	
DUTY TITLE	PROGRAMME DEVELOPMENT OF AGRICULTURAL TECHNOLOGY EXTENSION	DUTY NO.	806
TASK TITLE	DEVELOPMENT OF AGRICULTURAL TECHNOLOGY EXTENSION PROJECT PLANS AND ORGANIZATION OF THEIR IMPLEMENTATION	TASK NO.	8061
PERFORMANCE CRITERIA	The person performing this task must be able to develop agricultural technology extension programmes in accordance with the requirements of technology diffusion in production, etc.		
RANGE STATEMENT	The task can be performed in the plantation area under the supervision of crop planting engineers. The tools and equipment to be used include: 1. Computers; 2. Literature data such as regional cultivation background; 3. Research reports on the technological demands that exist in production; 4. New varieties, products, materials, etc. that need to be promoted.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Develop plans for technology promotion projects; 2. Organise and implement extension projects; 3. Obtain the background information required for the task; 4. Obtain the policy support needed for the task; 5. Obtain other conditions required for the task.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Develop agricultural technology extension project plans and organise their implementation. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Principles for the development of technology promotion project plans; 2.2 Precautions of the development of technology promotion programmes. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Principles for developing agricultural technology extension projects; 3.2 Conditions to be considered for the development of agricultural technology extension projects; 3.3 Outline of the contents of agricultural technology extension projects; 3.4 Methods of designing and creating	

	questionnaires; 3.5 Relevant agricultural policies and regulations of local governments; 3.6 Overview of local agricultural development. 4.0 Essential Skills 4.1 Logical analysis ability; 4.2 Problem analysis and solving skills; 4.3 The ability to connect theory with practice; 4.4 Reporting and writing skills; 4.5 Computer application skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The detailed agricultural technology extension projects are developed and organised in accordance with the production of the plantation area.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Occupational health and safety.

OCCUPATION	CROP PLANTING ENGINEER	OCCUPATION CODE	
DUTY TITLE	PROGRAMME DEVELOPMENT OF AGRICULTURAL TECHNOLOGY EXTENSION	DUTY NO.	806
TASK TITLE	PREPARATION OF PROJECT SUMMARIES FOR AGRICULTURAL TECHNOLOGY EXTENSION	TASK NO.	8062
PERFORMANCE CRITERIA	The person performing this task must be able to write summaries and draw scientific conclusions in accordance with the requirements of the agricultural technology extension project.		
RANGE STATEMENT	The task can be performed in the workroom under the supervision of crop planting engineers. The tools and equipment to be used include: 1. Computers; 2. Common mainstream literature retrieval tools; 3. Summary writing software.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Review the literature to complete the text writing on the background and significance of the extension project; 2. Summarize the results of project implementation; 3. Analyse the benefits achieved through project implementation; 4. Summarize the experience gained and problems in the extension project; 5. Propose priorities for next steps.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Write the summary. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Basic requirements for writing summaries of agricultural science and technology extension projects and writing methods. 3.0 Theories The person performing this task must be able to explain the following: 3.1 The main contents and writing requirements of agricultural technology extension project summaries; 3.2 Project implementation results and data analysis methods. 4.0 Essential Skills 4.1 Comprehensive writing skills; 4.2 Verbal expression skills; 4.3 Competence of consulting;	

	4.4 Analytical and summarizing skills; 4.5 Computer application skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Summaries are completed in accordance with the requirements of the agricultural technology extension project.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Occupational health and safety.

OCCUPATION	CROP PLANTING ENGINEER	OCCUPATION CODE	
DUTY TITLE	PROGRAMME DEVELOPMENT OF AGRICULTURAL TECHNOLOGY EXTENSION	DUTY NO.	806
TASK TITLE	ORGANIZATION OF TRAINING FOR FARMERS	TASK NO.	8063
PERFORMANCE CRITERIA	The person performing this task must be able to organise farmer training in accordance with the project requirements of agricultural technology extension.		
RANGE STATEMENT	The task can be performed in the designated premises under the supervision of crop planting engineers. The tools and equipment to be used include: 1. Computers; 2. Multimedia playback equipment; 3. Publicity boards; 4. Sites that accommodate most farmers.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Collect farmers' technology needs; 2. Prepare training handout and courseware; 3. Develop the management and servicing of technical training in different forms; 4. Summarize technical training.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Design training curricula for farmers; 1.2 Organise technical training for farmers. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Importance of farmer training in agricultural technology extension; 2.2 Principles for setting the content of farmer training. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Characteristics of agricultural technology extension education; 3.2 Characteristics of farmers' learning and methods of technical training; 3.3 Requirements of farmers' learning psychology; 3.4 Application of teaching aids. 4.0 Essential Skills 4.1 Organizational and coordination skills;	

	4.2 Technical dissemination of software application skills; 4.3 Expression and communication skills; 4.4 Application skills of multimedia teaching equipment.
DESCRIPTION OF THE END PRODUCT / SERVICE	Tasks such as data collection, venue set-up and technical training for farmers' technical training are completed in accordance with the project requirements of agricultural technology extension.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Occupational health and safety.

OCCUPATION	CROP PLANTING ENGINEER	OCCUPATION CODE	
DUTY TITLE	OPERATION AND MANAGEMENT IN PLANTATION AREAS	DUTY NO.	807
TASK TITLE	BUSINESS PLANNING AND OPERATIONAL ANALYSIS OF PLANTATION AREAS	TASK NO.	8071
PERFORMANCE CRITERIA	The person performing this task must be able to plan the overall operation of the plantation area in accordance with the objectives expected to be achieved by the plantation area, and be able to analyse the operation of the plantation area in a dynamic and scientific manner.		
RANGE STATEMENT	The task can be performed in the workroom under the supervision of crop planting engineers. The tools and equipment to be used include: 1. Computers and various business planning and operational analysis reference books; 2. Common mainstream retrieval tools; 3. Business planning models; 4. ERP software; 5. Blockchain software; 6. Big data software for operational analytics.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Analyse the external environment; 2. Analyse the internal environment; 3. Identify the mission and vision; 4. Identify planning objectives; 5. Evaluate and select planning programmes; 6. Strategize on functional sectors; 7. Operationalize and control planning; 8. Manage the plantation area's production, supply and marketing in a balanced manner by ERP software; 9. Plan and manage plantation area funds by blockchain software; 10. Use big data software to analyse plantation area operations.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Conduct plantation area business planning and operational analysis. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 The basic principles of business planning and operational analysis of plantation areas; 2.2 Analysis methodology for plantation area operations. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Business planning process; 3.2 Formula for the operating capacity indicator. 4.0 Essential Skills 4.1 Information-gathering skills;	

	4.2 Problem analysis and solving skills; 4.3 The ability to connect theory with practice; 4.4 Communication and exchange skills; 4.5 Teamwork skills; 4.6 Reporting and writing skills; 4.7 Computer application skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The operation of the plantation area is correctly planned and dynamically and scientifically analysed in accordance with the actual situation of the plantation area.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Occupational health and safety.

OCCUPATION	CROP PLANTING ENGINEER	OCCUPATION CODE	
DUTY TITLE	OPERATION AND MANAGEMENT IN PLANTATION AREAS	DUTY NO.	807
TASK TITLE	RESOURCE MANAGEMENT FOR PLANTATION AREAS	TASK NO.	8072
PERFORMANCE CRITERIA	The person performing this task must be able to manage the resources in the six categories of human resources, infrastructure, work environment, financial resources, suppliers and partners, and knowledge information and technology in accordance with the management objective in the plantation area. Of these, human and financial resources will be set out under other duties (tasks).		
RANGE STATEMENT	The task can be performed in the plantation area and office under the supervision of crop planting engineers. The tools and equipment to be used include: 1. Computer and resource management reference books; 2. Common mainstream retrieval tools; 3. Infrastructure and ancillary facilities such as roads, water, electricity and communications in plantation areas; 4. IoT technology software (greenhouse environment); 5. SCM software; 6. Knowledge information and technology software.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Coordinate the layout, daily maintenance and management of infrastructure and ancillary facilities such as roads, water, electricity, communications in the plantation area with relevant personnel; 2. Coordinate with relevant personnel for 5S management of plantation area work sites; 3. Use SCM software for operation and management; 4. Provide cooperation requirements to help managers make scientific decisions and find strategic partners.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Manage resources in the plantation area. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Scope of resource management in plantation areas; 2.2 Resource management standards. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Technical requirements for the resource management of the infrastructure; 3.2 Technical requirements for managing resources in the work environment; 3.3 Technical requirements for the resource management of suppliers and partner;	

	3.4 Technical requirements for knowledge information and technology resource management; 3.5 Plantation area infrastructure layout planning requirements. 4.0 Essential Skills 4.1 Organizational and coordination skills; 4.2 Problem analysis and solving skills; 4.3 The ability to connect theory with practice; 4.4 Communication and exchange skills; 4.5 Teamwork skills; 4.6 Forecasting, decision-making skills; 4.7 Computer application skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	All kinds of resources in the plantation area are scientifically managed in accordance with the actual situation of the science by advanced technological means.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Occupational health and safety.

OCCUPATION	CROP PLANTING ENGINEER	OCCUPATION CODE	
DUTY TITLE	OPERATION AND MANAGEMENT IN PLANTATION AREAS	DUTY NO.	807
TASK TITLE	IMPLEMENTATION OF PRODUCTION MANAGEMENT IN PLANTATION AREAS	TASK NO.	8073
PERFORMANCE CRITERIA	The person performing this task must be able to manage production in accordance with plantation area management objectives.		
RANGE STATEMENT	The task can be performed in the workroom and plantation areas sunder the supervision of crop planting engineers. The tools and equipment to be used include: 1. DSS, the decision support system for crop production management; 2. Technical data on crop production; 3. Traceability management system for standardized crop production.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Predict the production of plantation areas and to utilize the crop production management decision support system DSS for production management decisions; 2. Grow and process crops in the plantation area; 3. Select the planting sites in the agricultural plantation area (fields), apply labour quotas and labour organization, set up production organization management such as production management system; 4. Perform production control management such as controlling planting schedule, plantation area product inventory, product quality, cost and quantity; monitor crops with the automated monitoring platform of the standardized production traceability system.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Apply advanced technology software for scientific production management decision-making, specific production management and monitoring. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Production management decisions in the plantation area; 2.2 Technologies related to production management in plantation areas. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Production management forecasting and decisions in the plantation area; 3.2 Latest relevant technical requirements for production management in plantation areas. 4.0 Essential Skills 4.1 Market investigation skills; 4.2 Problem analysis and solving skills;	

	4.3 The ability to connect theory with practice; 4.4 Communication and exchange skills; 4.5 Teamwork skills; 4.6 Forecasting, decision-making skills; 4.7 Computer application skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Scientific production management decisions are implemented in accordance with the market situation, applying advanced technological software to the plantation area, and in this way specific production management and control is carried out.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Occupational health and safety.

OCCUPATION	CROP PLANTING ENGINEER	OCCUPATION CODE	
DUTY TITLE	OPERATION AND MANAGEMENT IN PLANTATION AREAS	DUTY NO.	807
TASK TITLE	MARKETING MANAGEMENT AND ACCOUNT MANAGEMENT IN PLANTATION AREAS	TASK NO.	8074
PERFORMANCE CRITERIA	The person performing this task must be able to manage marketing and accounts in accordance with plantation area management objectives.		
RANGE STATEMENT	The task can be performed in the workroom under the supervision of crop planting engineers. The tools and equipment to be used include: 1. Computers and marketing management and bookkeeping reference books; 2. Common mainstream retrieval tools; 3. CRM software; 4. Kingdee.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Conduct branding of plantation area crops; 2. Apply discount pricing, psychological pricing, differential pricing, regional pricing, combination pricing, and new product pricing strategies for product pricing; 3. Apply cross-border catering, webcasting, microbusiness, e-commerce, crowdfunding, direct sales stores and other promotional channels to promote sales; 4. Work with marketing models such as event marketing, word-of-mouth marketing, hunger marketing, knowledge marketing, interactive marketing, and emotional marketing; 5. Conduct marketing mix work with CRM software; 6. Complete the initial set-up of the accounts; 7. Fill out and review vouchers; 8. Register of accounts; 9. Prepare financial reports.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Perform marketing management and account management. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Main elements of marketing management and account management. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Marketing mix content; 3.2 Basic process of account management. 4.0 Essential Skills 4.1 Brand planning skills; 4.2 Verbal expression skills; 4.3 The ability to connect theory with practice; 4.4 Marketing planning skills; 4.5 Computer application skills; 4.6 Accounting treatment skills.	

DESCRIPTION OF THE END PRODUCT / SERVICE	Marketing management is carried out flexibly in accordance with the actual situation of the plantation area, and in this way account management is carried out carefully and rigorously.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Green foods; 2. Agribusiness accounting practices; 3. Occupational health and safety.

OCCUPATION	CROP PLANTING ENGINEER	OCCUPATION CODE	
DUTY TITLE	HUMAN RESOURCES MANAGEMENT FOR PLANTATION AREAS	DUTY NO.	808
TASK TITLE	HUMAN RESOURCE PLANNING FOR PLANTATION AREAS	TASK NO.	8081
PERFORMANCE CRITERIA	The person performing this task must be able to carry out overall human resources planning in accordance with the strategic objectives of the plantation area, and to supervise and check the implementation of human resources planning, identify problems for specific countermeasures.		
RANGE STATEMENT	The task can be performed in the workroom under the supervision of crop planting engineers. The tools and equipment to be used include: 1. Computers and human resource analysis reference books; 2. Common mainstream retrieval tools; 3. Human resources management systems; 4. Employee self-service app app-side software; 5. Office automation software.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Analyse the internal and external environmental factors that affect human resources planning in the enterprise; 2. Gather information that is relevant to the strategic decisions of the enterprise; 3. Gather information about the business environment in which the company operates; 4. Collect and process enterprise information; 5. Analyse the human resources information base; 6. Analyse the influencing factors for the demand and supply of human resources; 7. Forecast the supply and demand of human resources; 8. Develop a master plan and sub-plans for harmonizing the balance between supply and demand for human resources; 9. Evaluate and amend personnel planning.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Plan human resources for plantation areas. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Basic principles of plantation area staff planning. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Methods of collecting and processing organizational information; 3.2 Methods of drawing organizational charts; 3.3 Methods of collecting organizational information; 3.4 Methods of human resource demand prediction; 3.5 Methods of utilizing the human resources management system. 4.0 Essential Skills 4.1 Information-gathering skills;	

	4.2 Problem analysis and solving skills; 4.3 The ability to connect theory with practice; 4.4 Communication and exchange skills; 4.5 Teamwork skills; 4.6 Reporting and writing skills; 4.7 Computer application skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Human resource planning for the plantation area is scientifically grounded in accordance with the actual plantation area situation.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Occupational health and safety.

OCCUPATION	CROP PLANTING ENGINEER	OCCUPATION CODE	
DUTY TITLE	HUMAN RESOURCES MANAGEMENT FOR PLANTATION AREAS	DUTY NO.	808
TASK TITLE	STAFF RECRUITMENT AND STAFFING IN THE PLANTATION AREA	TASK NO.	8082
PERFORMANCE CRITERIA	The person performing this task must be able to plan for the recruitment and staffing of employees based on the strategic goals of the plantation area as well as the human resource planning situation.		
RANGE STATEMENT	The task can be performed in the plantation area, workroom and the labor market outside the enterprise under the supervision of crop planting engineers. The tools and equipment to be used include: 1. Computer and resource management reference books; 2. Common mainstream retrieval tools; 3. Recruitment materials of the plantation area, such as corporate profile, recruitment application forms, promotional materials; 4. Equipment such as videotape recorders, cameras, projectors needed for the plantation area to participate in the job fair; 5. Advertisements, internet, media, etc.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Analyse the reasons why plantation areas conduct recruitment; 2. Analyse the ways in which different recruitment channels are used; 3. Conduct employee quality assessments; 4. Apply recruitment and selection methods; 5. Organise recruitment implementation procedures; 6. Use human resource allocation techniques.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Perform staff recruitment and staffing in the plantation area. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Basic methods of employee quality assessment. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Employee recruitment channels and methods; 3.2 Methods of efficient allocation of human resources; 3.3 Methods of constructing employee quality assessment systems; 3.4 Process of organising and conducting interviews. 4.0 Essential Skills	

	4.1 Coordination skills; 4.2 Problem analysis and solving skills; 4.3 The ability to connect theory with practice; 4.4 Communication and exchange skills; 4.5 Teamwork skills; 4.6 Organizational and coordination skills; 4.7 Computer application skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Employee recruitment and staffing is conducted in accordance with the actual situation, operation and human resources planning in the plantation area.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Occupational health and safety.

OCCUPATION	CROP PLANTING ENGINEER	OCCUPATION CODE	
DUTY TITLE	HUMAN RESOURCES MANAGEMENT FOR PLANTATION AREAS	DUTY NO.	808
TASK TITLE	EMPLOYEE TRAINING AND EFFECTIVENESS EVALUATION	TASK NO.	8083
PERFORMANCE CRITERIA	The person performing this task must be able to conduct employee training and effectiveness evaluations in accordance with the requirements of the plantation area.		
RANGE STATEMENT	The task can be performed in the workroom and plantation areas sunder the supervision of crop planting engineers. The tools and equipment to be used include: 1. Computers and employee training related reference books; 2. Common mainstream retrieval tools; 3. Training needs questionnaires, surveys, etc.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Design and develop training for plantation areas; 2. Analyse employees training needs in the plantation area; 3. Organise and implement employee training; 4. Evaluate training in plantation areas; 5. Account for employee training costs; 6. Evaluate the effectiveness of the training.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Design employee training and evaluation of training effectiveness in the plantation area. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Principles for implementing employee training. 3.0 Theories The person performing this task must be able to explain the following: 3.1 The basic process of employee training; 3.2 Methods of training evaluation; 3.3 Training needs analysis methodology; 3.4 Procedures for implementing training needs analysis; 3.5 Methods of collecting information on training needs; 3.6 Steps in training evaluation. 4.0 Essential Skills 4.1 Comprehensive writing skills; 4.2 Verbal expression skills; 4.3 Communication and exchange skills;	

	4.4 Organizational and coordination skills; 4.5 Teamwork skills; 4.6 Computer application skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The design, implementation and evaluation of employee training are effectively accomplished in accordance with the training needs of plantation area employees.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Occupational health and safety.

OCCUPATION	CROP PLANTING ENGINEER	OCCUPATION CODE	
DUTY TITLE	HUMAN RESOURCES MANAGEMENT FOR PLANTATION AREAS	DUTY NO.	808
TASK TITLE	PERFORMANCE AND COMPENSATION MANAGEMENT IN THE PLANTATION AREA	TASK NO.	8084
PERFORMANCE CRITERIA	The person performing this task must be able to manage compensation and performance in accordance with the requirements of the plantation area management objectives.		
RANGE STATEMENT	The task can be performed in the workroom under the supervision of crop planting engineers. The tools and equipment to be used include: 1. Reference books for computers and all types of management resources; 2. Common mainstream literature retrieval tools; 3. Payroll system software; 4. Attendance software.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Develop performance appraisal criteria; 2. Design the performance management process; 3. Implement the performance appraisal process and basic steps; 4. Complete basic pay design; 5. Count and calculate employee payroll; 6. Manage employee benefit costs.		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Design performance and compensation management systems. 2.0 Principle The person performing this task must be able to explain the following principles: 2.1 Design principles for performance and compensation management. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Basic principles and fundamental approaches to performance management system design; 3.2 Content and principles of remuneration management. 4.0 Essential Skills 4.1 Comprehensive writing skills; 4.2 Verbal expression skills; 4.3 Data analysis competence; 4.4 Communication and coordination skills.	

DESCRIPTION OF THE END PRODUCT / SERVICE	Performance and compensation management is designed and implemented in accordance with the objectives of the plantation area to facilitate the long-term development of the plantation.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Occupational health and safety.

TABLE 1: DACUM CHARTS FOR CROP PLANTING ENGINEER - NTA 8

DUTIES	TASKS	ENABLERS
1.0 Soil analysis of plantation areas and development of fertilization schedules	1.1 Determination of soil fast-acting nutrients and data analysis.	General skills and knowledge General skills • Skills in planting and cultivation of common crops • Fertilizer application skills • Skills for determining the period of fertilization • Skills for determining effective soil nutrients • Report writing skills • Problem analysis and solving skills • The ability to connect theory with practice • Communication and exchange skills • Teamwork skills Universal knowledge • Concept of PSCMF • Knowledge of the principles of soil fast-acting nutrient determination • Standards for soil nutrient data analysis • Knowledge of fertilization pattern of crops • Knowledge of the nature of organic and inorganic fertilizers • Calculation and selection of crop fertilizer requirements Tools and equipment Tools: spades, earth augers, shovels, cutting rings, soil sieves, grinding bowls, wide-mouth flasks, fine-mouth flasks, test tubes, decoction tubes, diffusion dishes, conical bottles, volumetric flasks, funnels, beakers, and other glass instruments Equipment: thermostats, oscillators, analytical balances, sterilizers, spectrophotometers, flame photometers, pH meters, conductivity meters Materials: soil samples from different production environments Experimental drugs: test drugs such as ferrous sulfate, potassium chloride and concentrated sulphuric acid
	1.2 Development of PSCMF schedule.	

		Experimental consumables: pH wide-range test paper, qualitative filter paper, label tags and other test consumables, inorganic fertilizers such as urea, calcium superphosphate, potassium chloride, organic fertilizers such as chicken feces, pig feces Requirements for employees Seeking truth from facts, rigor and clarity of reasoning, meticulous in observation, with the ability to identify, analyse and solve problems
2.0 Plant protection programme development in the plantation area	2.1 Crop diseases and insect pests prediction and forecasting.	General skills and knowledge General skills • Logical analysis ability • Problem analysis and solving skills • The ability to connect theory with practice • Communication and exchange skills • Teamwork skills • Reporting and writing skills • Computer application skills • Skills in recognizing and diagnosing plant diseases and insect pest • Skills in predicting and forecasting plant diseases and insect pest • Skills in plant disease diagnosis • Pest identification skill • Plant diseases and insect pest integrated management skill Universal knowledge • Microscopic diagnosis of plant disease pathogens • Factors affecting the occurrence of plant diseases • Insect external morphology recognition • Insect habits • Generations and annual life histories of insects • Insect development • Plant quarantine • Agricultural control • Physical-mechanical control methods • Biological control • Chemical control
	2.2 Development of integrated prevention and control plan for crop diseases and insect pests.	

		Tools and equipment Tools: general biological microscopes, spore traps, small weather stations, magnifiers, sweep nets, lures, tweezers, insect cage, measuring cup, scrapers, brushes Equipment: materials, coverslips, glass slides, lures, pesticides Requirements for employees Seeking truth from facts, rigor and clarity of reasoning, meticulous in observation, with the ability to identify, analyse and solve problems
3.0 Design and implementation of agricultural science experiments	3.1 Design and implementation of agricultural science experiments.	General skills and knowledge General skills: • Crop cultivation production skills • Information retrieval skills • Literature review skills • Programming skills • Software operation skills • Data analysis competence • Reporting and communication skills Universal knowledge: • Knowledge of probability and statistics • Knowledge of field experiment design • Knowledge of field experiment implementation • Software application knowledge • Data analysis knowledge • New industrial technology • Industry new equipment • Computer application knowledge • Knowledge of crop cultivation and breeding Tools and equipment Tools: Subdivision signages, steel tapes, tape measures, shovels, cameras. Equipment: supporting production equipment such as tractors and ridging and tilling machines, irrigation equipment such as drip and sprinkler irrigation, computers, Excel and SPSS software Materials: seeds, seedlings and other test materials, soil disinfectants, fast-acting fertilizers, mulching films, glass strings, label tags and other test consumables
	3.2 Test data investigation and analysis.	
	3.3 Preparation of experimental summaries and scientific papers based on experimental results.	

		Requirements for employees Work attitude of pursuit of excellence, dedication, seeking truth from facts, and innovation
4.0 Harmless treatment of agricultural waste	4.1 Development and organization of the implementation of resource utilization programmes for livestock and poultry feces.	General skills and knowledge General skills: • Information retrieval skills • Programming skills • Common agricultural waste identification and fermentation treatment skills • Problem analysis and solving skills • The ability to connect theory with practice • Communication and exchange skills • Teamwork skills • Reporting and writing skills • Agricultural mixers application skills Universal knowledge: • Software application knowledge • New industrial technology • Industry new equipment • Computer application knowledge • Knowledge of agricultural waste disposal Tools and equipment Tools: shovels, straw crushers, turners, mixers, computers, word software Equipment: agricultural residual film recycling machines, tractors, agricultural straw balers and other supporting production equipment, drip irrigation, sprinkler irrigation and other humidification equipment Materials: livestock and poultry feces, crop straw, agricultural residual films, insecticides, straw rotting agents; nitrogen, phosphorus, potassium and other inorganic fertilizers and other test consumables Requirements for employees Work attitude of teamwork, strict seriousness, persistence and concentration, linking theory to practice, and innovation
	4.2 Development and organization of the implementation of crop straw for resource utilization programmes.	
	4.3 Development and organization of a programme for the disposal of waste agricultural films.	
5.0 Applications of agricultural IoT	5.1 Integrated deployment, debugging and	General skills and knowledge General skills:

	troubleshooting of IoT software and hardware equipment for agriculture.	• Logical analysis ability • Skills in analyzing plant growth factor parameters • Sensor parameter setting • Sensor parameter adjustment • Data analysis competence • Monitoring and regulation of agro-environmental factors • Use of equipment for agricultural IoT applications • Computer application skills • Skills in planting and cultivation of common crops Universal knowledge: • Agricultural IoT software knowledge • Agricultural IoT hardware knowledge • Integrated deployment of agricultural IoT • Commissioning of hardware and software equipment for agricultural IoT • Agricultural IoT troubleshooting of hardware and software devices • Crop parameters on IoT environmental management • Production management of plantation areas with agricultural IoT equipment Tools and equipment Tools: digital multimeters; network cable crimpers; wire strippers; screwdrivers; electroprobes; measuring tapes; network testers Equipment: IoT monitoring terminals; router; IoT gateway; wireless sensor; WIFI or 4G/5G network; bluetooth, ZigBee application devices; data processing cloud platform Materials: crops Requirements for employees Ability to collaborate in a team, to be meticulousness and conscientious, to be well-organised, to do hands-on practical work, and to link theory to practice
	5.2 Configuration of agricultural IoT management parameters under actual situations.	
	5.3 Management of agricultural production by IoT.	
6.0 Programme development of agricultural	6.1 Establishment of objectives for agricultural	General skills and knowledge General skills:

technology extension	technology extension.	• Programming skills • Investigation and survey skills • Information retrieval skills • Data analysis competence • Copy editing skills • Software operation skills • Communication and coordination skills Universal knowledge: • Knowledge of agricultural technology extension • Programme editorial knowledge • Commonly-used research methods • Problem analysis methodology • Software application knowledge • Data analysis knowledge • Computer application knowledge Tools and equipment Tools: record books, promotional display boards Equipment: computers, multimedia playback equipment, Excel, Word software Materials: detailed information on technologies to be promoted Requirements for employees Work attitude of linking theory to practice, skillful in communication and coordination, ability to integrate the whole situation, dedication, rigor and meticulousness, seeking truth from facts and being innovative
	6.2 Identification of the work of agricultural technology extension.	
	6.3 Presentation of safeguards to achieve the objectives of technology diffusion.	
7.0 Operation and management in plantation areas	7.1 Business planning and operational analysis of plantation areas.	General skills and knowledge General skills: • Information-gathering skills • Problem analysis and solving skills • The ability to connect theory with practice • Communication and exchange skills • Teamwork skills • Reporting and writing skills • Computer application skills Universal knowledge: Tools and equipment
	7.2 Plantation area resource management.	
	7.3 Implementation of production management in plantation areas.	
	7.4 Marketing management and account	

	management in plantation areas.	Tools: reference books on plantation area operation and management, common mainstream retrieval tools, plantation area operation and management sand tables Equipment: computers with Internet access installed with software such as ERP, blockchain, big data, IoT technology, SCM, knowledge information and technology software, CRM software, Kingdee, production management decision support system, crop production management technology, crop standardized production traceability management system, etc. Materials: infrastructure and ancillary facilities such as roads, water, electricity and communications in plantation areas Requirements for employees Hardworking, dedication, seeking truth from facts, rigor and clarity of reasoning, meticulous in observation, with the ability to identify, analyse and solve problems
8.0 Human resources management for plantation areas	8.1 Plan human resources for plantation areas.	General skills and knowledge General skills: • Information-gathering skills • Problem analysis and solving skills • Writing skills • The ability to connect theory with practice • Organizational and coordination skills • Teamwork skills • Reporting and writing skills • Computer application skills Universal knowledge: • Organizational structure charting • Methods of human resource demand prediction • Application of the human resources management system • Common recruitment selection methods • Construction of employee quality assessment system • Training needs analysis methodology • Procedures for implementing training needs analysis • Selection of training methods
	8.2 Employee recruitment and staffing.	
	8.3 Employee training and effectiveness evaluation.	
	8.4 Performance and salary management.	

		• Balanced scorecard methodology • Laws and regulations on payroll management Tools and equipment Tools: human resources reference books for the plantation area and common mainstream search tools Equipment: human resources management system, employee self-service APP application software, office automation software, video recorders, cameras, projectors, computers with Internet access installed with software such as human resource management system, office automation, employee quality assessment, SPSS, payroll system, time and attendance system, etc. Materials: training needs questionnaires, surveys, etc. Requirements for employees With excellent ideological qualities, correct values, hard-working, dedicated to work, with strong innovation, expression and communication skills, and social skills
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