

Demonstrate an understanding of the Role and Requirements of Water in Plants Facilitator's Guide

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- 2 -

**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1**

Facilitator's Guide :

**Demonstrate an understanding of the
Role and Requirements of Water in Plants**

A c k n o w l e d g e m e n t s

Developed by

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**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1**

Facilitator's Guide :

**Demonstrate an understanding of the
Role and Requirements of Water in Plants**

Contents Page

DESCRIPTION	PG NO
Study Session Overview	4
The Unit Standard : Demonstrate an understanding of the role and requirements of water	15
Day 1 : Introduction	20
Day 1 - Lesson 1 : Plants and Water	24
Day 2 - Lesson 2 : Plant Water Needs	30
Day 2 - Lesson 3 : Evapotranspiration	36

**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1
Facilitator's Guide :
Demonstrate an understanding of the
Role and Requirements of Water in Plants**

Study Session Overview

Study Session Purpose

This study session forms part of the General Certificate in Ornamental Horticultural, NQF Level 1 and is aligned with the Unit Standard Demonstrate an understanding of the Role and Requirements of Water in Plants, worth 3 credits.

The purpose of this study session is to equip learners with the knowledge necessary to understand the importance of water to plants, the seasonal and climatic factors and the way in which they influence the water requirements of plants, which forms the knowledge base for people working with plants within the ornamental horticulture or landscaping industry.

This knowledge will form the basis of the learners' horticultural studies and help them to meet the assessment criteria, as outlined by the Unit Standard, namely:

- Explain the influence that the amount of water received by a plant has on its growth.
- Describe the effect that the frequency of watering has on a plant's growth.
- Describe the transporting of water and nutrients in a plant.
- Explain the factors that influence the water requirements of plants.
- Describe the water needs of the major plant types.

**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1
Facilitator's Guide :
Demonstrate an understanding of the
Role and Requirements of Water in Plants**

- Explain the importance of frequent watering to ensure that water is available to the root zone of newly planted seedlings and transplanted plants.
- Explain the reason why an additional frequency of watering must be conducted when root loss or disturbance in transplanting occurs.
- Explain the effects of various climatic conditions on evaporation.
- Describe the conditions that affect transpiration in a plant.
- Explain the combined effects of evaporation and transpiration, in the calculation of the E.T.

Specific Outcomes

This study session covers all the Specific Outcomes as outlined in the Unit Standard : Understanding the role and requirements of water in plants, namely:

- Describe the role that water plays in the growth and development of plants.
- Identify the water requirements of the major plant types.
- Show an understanding of the importance of watering seedlings and newly planted (transplanted) plants.
- Recognise the factors that influence evapotranspiration.

Unit Standard Pre-requisites

Basic Plant Structure.

**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1
Facilitator's Guide :
Demonstrate an understanding of the
Role and Requirements of Water in Plants**

NQF Principles

This study session has been designed to meet with the principles of the National Qualifications Framework. The lessons are outcomes based and aligned with an Agriculture and Nature Conservation Unit Standard. The competence acquired is portable and the content will articulate across the Horticulture industry.

The Learning System

The Learning Systems used in this study session are **outcomes based and process centered**.

The learner is expected to achieve competence in the process first and foremost. If the process is understood, learners can then adapt their actions under a range of different situations to include problem solving, critical thinking, diagnostics etc. This also means that learners can apply the same skill in different contexts, where the outcome is the same.

Furthermore learners develop the competence to reflect on decisions made and judge the value and effectiveness of their performance in the outcomes mentioned.

**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1
Facilitator's Guide :
Demonstrate an understanding of the
Role and Requirements of Water in Plants**

In an effort to replicate the workplace situation, learners will use workplace examples and context to recognise the different parts of a plant and their functions.

This learning process caters for all learning styles and preferences.

Bloom's Level

This study session has been designed at Blooms Cognitive Doom, Comprehension level in accordance with the level set by the Specific Outcome and Assessment Criteria of the Unit Standard : Understanding the role and requirements of water in plants.

**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1**

Facilitator's Guide :

**Demonstrate an understanding of the
Role and Requirements of Water in Plants**

How this study session works

This study session has been divided into three lessons, held over a period of 2 days:

Lesson 1: Plants & Water	After learners have worked through Lesson 1, they should be able to: <ul style="list-style-type: none">▪ Explain the influence that the amount of water received by a plant has on its growth.▪ Describe the effect that the frequency of watering has on a plant's growth.▪ Describe the transporting of water and nutrients in a plant.
Lesson 2: Plant Water Needs	After learners have worked through Lesson 2, they should be able to: <ul style="list-style-type: none">▪ Explain the factors that influence the water requirements of plants.▪ Describe the water needs of the major plant types.▪ Explain the importance of frequent watering to ensure that water is available in the root zone of newly planted seedlings and transplanted plants.▪ Explain why an additional frequency of watering must be conducted when root loss or disturbance in transplanting occurs.
Lesson 3: Evapotranspiration	After learners have worked through Lesson 3, they should be able to: <ul style="list-style-type: none">▪ Explain the effects of various climatic conditions on evaporation.▪ Describe the conditions that affect transpiration.▪ Explain the combined effects of evaporation and transpiration, in the calculation of the E.T.

**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1
Facilitator's Guide :
Demonstrate an understanding of the
Role and Requirements of Water in Plants**

The Delivery Methods

Background notes have been written throughout this Guide to enable the facilitator to understand the essential background, concepts and frames of reference used by the design team during the development of this study session.

The target audience profile conducted indicates the need for highly interactive and motivating lessons with much of the work being done by the learners. The study session design is therefore highly interactive and has as its premises the following core Learning Methodology:

- Trainee 'state' management to draw on the curiosity, anticipation, suspense, confidence building, delight and exploration in order to ready trainees for learning.
- Mind-set management to address trainees' learning barriers and mental reservations about the training at the outset of the experience.
- Planned format variety to stimulate all five of the learners' senses i.e. sight, sound smells, taste and touch and to appeal to the Visual, Auditory and Kinesthetic learning styles identified by NLP.
- Participant-centered activities to actively involve learners in the learning process. The activities are comprehensive, practical and experiential in nature with great emphasis on the process, which *integrates* foundational, practical and reflective competence.
- Activities are based on "real work" where learners work with real workplace scenarios and case studies.

**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1
Facilitator's Guide :
Demonstrate an understanding of the
Role and Requirements of Water in Plants**

The range of delivery methods include:

- Experiential activities, Demonstrations, Observation, Lecture and Self-study.

The trainer's role throughout these study sessions is that of a guide, a mentor, and a facilitator. Where explanations are needed these are provided for the facilitator.

Your responsibility as a facilitator using this material is to establish:

- Trust – without trust we feel foolish and cease to learn. Trust is vital because many of the activities require a willingness to give genuine feedback and to experience feedback in order to develop and progress.
- Curiosity.
- Enthusiasm – nothing works better than a little enthusiasm. Enthusiasm is contagious. If you, the facilitator, are enthusiastic about the outcomes of the activities, and genuinely believe in what is possible, your enthusiasm will be communicated to the participants. It is essential to believe in the activities and feel an adventurous excitement about what can achieve.

Specific learning outcomes listed at the beginning of each section within both the Facilitator's Guide and Learner's Workbook serve to guide and inform the learning.

**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1
Facilitator's Guide :
Demonstrate an understanding of the
Role and Requirements of Water in Plants**

Learner Roles and Responsibilities

The learner is expected to actively take part in the lessons by:

- Taking part in and completing group activities, practical assignments and discussions.
- Planning and preparing for the training.
- Asking for support when needed.
- Giving meaningful input into and challenging the status quo.
- Finding new and better ways of doing things
- Developing sound and effective practices given the input from the facilitator and the rest of the group
- Comply with assessment requirements.

Learner Guidance and Support

The facilitator will provide guidance as to the content and suitability of the course to potential delegates.

Throughout the learning experience, the facilitator will:

- Provide ongoing support to the learners to assist them with the achievement of the outcomes.
- Provide delegates with all the necessary training material.
- Manage the learning process during the training.

**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1**

Facilitator's Guide :

**Demonstrate an understanding of the
Role and Requirements of Water in Plants**

Assessment Strategy

Assessment is focused on the applied competence of the learner and the assessment criteria are determined by the relevant unit standard.

- **Formative** - Learners are assessed continually during the lessons, by means of practical and experiential activities.
- **Summative** – Assessment is integrative and evidence is collected through a knowledge questionnaire.
- **Rating** – On successful completion of the summative assessment, learners are rated "Competent" or "Not Yet Competent" against the Unit Standard assessment criteria.

The laid down policies and procedures with regard to assessment, moderation, RPL and appeals govern this assessment.

Facilitator Qualifications

Facilitators must be selected based on their Education, Training & Development experience (facilitation / learner support/ plan a learning programme/ assessment) as well as subject matter expertise.

The facilitator must at least have a qualification on an equal NQF level as the qualification that they are facilitating or a qualification at a higher NQF level.

**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1**

Facilitator's Guide :

**Demonstrate an understanding of the
Role and Requirements of Water in Plants**

Program Evaluation

The program evaluation will be conducted using an on-course evaluation checklist, assessment results and feedback from the assessors.

The value of the study session will be judged in terms of Learner reaction, learning, behaviour, and transfer of learning to the workplace measured through results of learning and workplace assessments.

Facilitator Evaluation On-course evaluations forms will be used to judge:

- The facilitation skills of the facilitator.
- That the learning outcomes were stated clearly.
- That the key or major learning points were illustrated and clarified.
- That the learning outcomes were met.
- That the key or major learning points were summarised.
- That the Principles of Adult Learning were applied.

Course Evaluation On-course evaluation forms will be used to judge:

- The extent to which the course achieved the learning outcomes.
- The overall learner reaction to the programme.
- The relevance of the content of the training material.
- The sequence, pacing and timing of the lessons.
- The effectiveness of the delivery methods and activities.
- Duration of the study sessions and the number of delegates.
- The extent to which the learning can be applied back on the job.
- The use of media, handouts and equipment.

**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1**

Facilitator's Guide :

**Demonstrate an understanding of the
Role and Requirements of Water in Plants**

The on-course evaluation forms will also be used to judge the value of: the logistic arrangements in terms of:

- The physical classroom environment.
- The seating arrangements.
- Meals and refreshments.
- Room layout.
- Accommodation (if applicable).

**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1**

Facilitator's Guide :

**Demonstrate an understanding of the
Role and Requirements of Water in Plants**

Unit Standard

Title	Demonstrate an understanding of the Role and Requirements of Water in Plants
Number	119714
Level	1
Credits	3
Field	Agriculture and Nature Conservation
Sub field	Horticulture
Issue date	2006-02-09
Learning assumed to be in place	Basic plant structure.

Specific Outcomes	Assessment Criteria
1. Describe the role that water plays in the growth and development of plants.	1.1 Explain the influence that the amount of water received by a plant has on its growth. 1.2 Describe the effect that the frequency of watering has on a plant's growth. 1.3. Describe the transporting of water and nutrients in a plant.
2. Identify the water requirements of the major plant types.	2.1. Explain the factors that influence the water requirements of plants. 2.2. Describe the water needs of the major plant types.
3. Show an understanding of the importance of watering seedlings and newly planted (transplanted) plants.	3.1. Explain the importance of frequent watering to ensure that water is available in the root zone of newly planted seedlings and transplanted plants.

**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1**

Facilitator's Guide :

**Demonstrate an understanding of the
Role and Requirements of Water in Plants**

Specific Outcomes	Assessment Criteria
	3.2. Explain the reasons why an additional frequency of watering must be conducted when root loss or disturbance in transplanting occurs.
4. Recognise the factors that influence evapotranspiration.	4.1. Explain the effects of various climatic conditions on evaporation. 4.2. Describe the effect transpiration in a plant. 4.3. Explain the combined effects of evaporation and transpiration, in the calculation of the E.T. are explained.

Embedded Knowledge

Embedded knowledge is reflected within the assessment criteria of each specific outcome and must be assessed in its own right, through oral and written evidence. Observation cannot be the only assessment.

**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1
Facilitator's Guide :
Demonstrate an understanding of the
Role and Requirements of Water in Plants**

Critical Cross Field Outcomes

- Identify and solve problems in which responses display that responsible decisions using critical and creative thinking have been made – specific outcome 4.
- Work effectively with others as a member of a team, group, organisation or community. Specific outcome embedded in the learning for this level of learner.
- Organise and manage oneself and one's activities responsibly and effectively.
- Collect, analyse, organise and critically evaluate information. Specific outcome 2 and 4.
- Communicate effectively using visual, mathematical and/or language skills in the modes of oral and/or written presentation. Specific outcome embedded in the learning for this level of learner.
- Use science and technology effectively and critically, showing responsibility toward the environment and health of others. Specific outcome 3.
- Demonstrate an understanding of the world as a set of related systems by recognising that problem-solving contexts do not exist in isolation. Specific outcome 2 and 3.

**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1
Facilitator's Guide :
Demonstrate an understanding of the
Role and Requirements of Water in Plants**

Unit Standard Accreditation and Moderation Options

1. Internal moderation.
2. External moderation.
3. Moderation of assessment will be overseen by the relevant ETQA, according to the moderation guidelines in the relevant qualification the agreed ETQA procedures.
4. Internal assessment.
5. External assessment with the relevant registered/accredited industry body/ETQA.
6. An Assessor accredited by the relevant ETQA, will assess the Learner's competency.
7. Formative and summative assessment of qualifying Learners against this unit standard should be in alignment with the requirements of the NSB.
8. Practical assessment activities will be used that are appropriate to the contents in which the qualifying Learners are working.
9. Assessment will include self and peer assessment, practical and oral assessment, observations, questions and answers, etc.
10. Direct observation is required in simulated or actual work conditions.
11. Reporting skills are demonstrated by effective communication, using verbal and/or writing skills.
12. Assessment is to be structured to include formative and summative component, as well as the submission of a Portfolio of Evidence.
13. The assessment should ensure that all the specific outcomes, critical cross field outcomes and embedded knowledge are assessed.

**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1**

Facilitator's Guide :

**Demonstrate an understanding of the
Role and Requirements of Water in Plants**

14. Specific outcomes must be assessed in their own right, through oral and practical evidence and cannot be assessed by observation only.
Essential embedded knowledge must be assessed in their own right, through oral and practical evidence and cannot be assessed by observation only.
15. Special outcomes and essential embedded knowledge must be assessed in relation to each other.
16. If qualifying Learners are able to explain the essential embedded knowledge, but are unable to perform the specific outcomes, then they should not be assessed as competent.
17. If qualifying Learners are able to perform specific outcomes, but are unable to explain the essential embedded knowledge, they should not be assessed as competent.
18. Evidence of the specified critical cross-field outcomes should be found, both in performance and in essential embedded knowledge.
19. Assessment activities must be fair, so that all Learners have equal opportunities. Activities must be free of gender, ethnic or other bias.
20. This unit standard can be assessed together with any other relevant registered unit standard.

**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1**

Facilitator's Guide :

**Demonstrate an understanding of the
Role and Requirements of Water in Plants**

Day 1 : Introduction

Note to Course Facilitator

Making the most of the first 60 minutes of the training:

The first 60 minutes of any learning intervention produces the highest learning volume per second than at any other stage of the program. This is your opportunity to mold the group into active, working learners. There are many worthwhile things to do at this stage:

- Neutralise the incipient teacher-pupil relationship.
- Begin to form a class community.
- Encourage participants to discover and start to correct any non-productive learning agendas they may have.
- Encourage participants to formulate definite in-course and post-course objectives for themselves.

The lesson introduction whilst focusing on the above outcomes also includes a focus on:

- Warming up of participants.
- Building confidence
- Building rapport.
- Eliciting of learning expectations.

**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1**

Facilitator's Guide :

**Demonstrate an understanding of the
Role and Requirements of Water in Plants**

Materials required:

- Standard classroom set up (u-shape).
- Standard stationery requirements.
- Facilitator's Guide.
- Learner Workbooks for each learner.
- Assessment Guide for each learner.
- Learner registration Forms.
- Learner Information Forms (AgriSETA)

Lesson duration 1 hour

**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1**

Facilitator's Guide :

**Demonstrate an understanding of the
Role and Requirements of Water in Plants**

Day 1 : Introduction		
Lesson Content	Purpose	Lesson Activities
<p>Welcome and Introductions</p>  <p>TIME: 20 MINUTES</p>	<p>To introduce the trainer and build learner confidence.</p>	<p>Use this session to:</p> <ul style="list-style-type: none"> • introduce yourself • tell the group a little about yourself <ul style="list-style-type: none"> • trainer's name • brief background <p>Tell the learners that you will be going around the room and you want each of them to tell you:</p> <ul style="list-style-type: none"> • Their name. • Where they work. • What type of work they do. • What they hope to learn, today.
<p>Lesson Overview</p>  <p>TIME: 20 MINUTES</p>	<p>To match what the learner hopes to learn with the Unit Standards specific outcomes and assessment criteria.</p>	<p>Discuss the Study Session Overview as per the notes on pages 4 to 12 of the learner workbook, covering::</p> <ul style="list-style-type: none"> • Purpose • Who is it for? • What's in it for you? • What about assessment? • The Unit Standard? • Who does what? <p>Complete learner registration forms and Learner Information Form (AgriSeta).</p>

**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1**

Facilitator's Guide :

**Demonstrate an understanding of the
Role and Requirements of Water in Plants**

Day 1 : Introduction		
Lesson Content	Purpose	Lesson Activities
Lesson Introduction 	To build learner confidence and enthusiasm for the learning.	Discuss the notes under Introduction, on page 13 of the learner's workbook. Discuss what will be covered today, finishing and starting times and any breaks.
TIME: 20 MINUTES		

**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1**

Facilitator's Guide :

**Demonstrate an understanding of the
Role and Requirements of Water in Plants**

Day 1

Lesson 1: Plants & Water

Notes to the Course Facilitator

At this stage of the workshop, you should have developed an informal, relaxed training atmosphere.

Lesson 1 develops the learning to meet Specific Outcome 1 of the Unit Standard

- **Describe the role that water plays in the growth and development of plants.**

At the end of this lesson, learners should be able to:

- Explain the influence that the amount of water received by a plant has on its growth.
- Describe the effect that the frequency of watering has on a plant's growth.
- Describe the transporting of water and nutrients in a plant.

The **lesson notes** must be used as an overall guide to facilitation. It is important that each facilitator personalise the learning experience to suit personal and learner styles. However, the learning outcomes, practical exercises, theory and assessment are strictly aligned with national unit standards and must therefore be covered as they have been set out in the material. . Comfort breaks must be organised according to the facilitator and learners liking.

**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1**

Facilitator's Guide :

**Demonstrate an understanding of the
Role and Requirements of Water in Plants**

Materials required:

- Examples of different root systems.
- For Activity 1,- osmosis experiment on page 16 - large potato, society sticks or “blou draad”, transparent glass, hot and cold water, sugar for each work group. This experiment takes between 2 to 6 hours to see noticeable changes. It is a good idea to conduct an experiment prior to the day, so that you can show learners the end result and then they can keep an eye on the experiment throughout the day.
- For Activity 2, page 18 – clear container, 5 mm of food colouring, flower, cutting knife for each work group.
- For Activity 3, page 20 – flip chart paper and a set of coloured crayons or pens for each work group.

Lesson duration 4 ½ hours

**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1**

Facilitator's Guide :

**Demonstrate an understanding of the
Role and Requirements of Water in Plants**

Day 1 :		
Lesson 1 Plants & Water		
Lesson Content	Purpose	Lesson Activities
Introduction	To introduce the learning	Cover Introduction, as per the notes on page 14 of the learner workbook.
Transporting of water and nutrients through the root Activity 1 	To build the learning to meet the specific outcome and related assessment criteria for this section.	Discuss as per the notes, on page 15, of the workbook. Conduct the Osmosis Experiment as per Activity 1, on page 16 of the workbook. Ask learners to share what they experienced and their insights.
TIME: 60 MINUTES		
Transporting of water and nutrients through the stem Activity 2	To build the learning to meet the specific outcome and related assessment criteria for this section.	Discuss as per the notes, on page 17, of the learner workbook. Conduct experiments as per Activity 2, on page 18 of the workbook. Ask learners: <ul style="list-style-type: none"> • Did your flower change colour? • How did the food colouring get into the flower?

**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1**

Facilitator's Guide :

**Demonstrate an understanding of the
Role and Requirements of Water in Plants**

Day 1 : Lesson 1 Plants & Water		
Lesson Content	Purpose	Lesson Activities
<p>So how does the stem take up water and nutrients from the roots.</p> 		<p>Lead discussion into the notes on page 19 of the workbook.</p>
<p>TIME: 60 MINUTES</p>		
<p>Activity 3</p> 	<p>A formative assessment to check that the learner can meet the assessment criteria:</p> <ul style="list-style-type: none">Describe the transporting of water and nutrients in a plant.	<p>Divide learners into small workgroups. Since research tells us that bigger groups will fragment and form break away groups, ensure that there are no more than 5 learners per work group.</p> <p>Ask learners to complete Activity 3, on page 20, of the learner workbook.</p> <p>Allow 15 minutes for this activity.</p> <p>Ask learners to stick their drawings up on the classroom walls.</p> <p>Ask each group to explain their drawing to the rest of the classroom.</p> <p>Make sure that all key learning points are covered.</p>
<p>TIME: 30 MINUTES</p>		

**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1**

Facilitator's Guide :

**Demonstrate an understanding of the
Role and Requirements of Water in Plants**

Day 1 :		
Lesson 1 Plants & Water		
Lesson Content	Purpose	Lesson Activities
<p>Photosynthesis.</p> 	<p>To build the learning to meet the specific outcome and related assessment criteria for this section.</p>	<p>Discuss as per the notes, on pages 21 and 22, of the learner workbook.</p>
TIME: 20 MINUTES		
<p>So how does water influence the plant's growth</p>	<p>To build the learning to meet the specific outcome and related assessment criteria for this section.</p>	<p>Discuss as per the notes, on pages 23 and 24, of the learner workbook.</p>
<p>Activity 4</p> 	<p>A formative assessment to check that the learner can meet the assessment criteria:</p> <ul style="list-style-type: none"> • Explain the influence that the amount of water received by a plant has on it's growth 	<p>Divide learners into small work groups and ask them to complete Activity 4, on page 25 of the learner workbook.</p> <p>Allow 15 minutes for completion of this activity.</p> <p>Give each learner a chance to share their answer, making sure that all key learning points have been covered:</p>
TIME: 30 MINUTES		
<p>Activity 5</p>	<p>A formative</p>	<p>Ask learners to complete Activity 5, on page 26 of the</p>

**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1**

Facilitator's Guide :

**Demonstrate an understanding of the
Role and Requirements of Water in Plants**

Day 1 : Lesson 1 Plants & Water		
Lesson Content	Purpose	Lesson Activities
	assessment to check that the learner can meet the assessment criteria: <ul style="list-style-type: none"> Describe the effect that the frequency of watering has on a plant's growth. 	learner workbook. Allow 15 minutes for the completion of the activity. Go around the room and give each learner a chance to answer the question. Ensure that all key learning points are covered.
<p>Conclusion</p>  <p>TIME: 20 MINUTES</p>	To close day 1, lesson 1.	Ask learners if check their learning by completing the lesson checkpoint on page 27 of the learner workbook. Allow 15 minutes for completion of this activity. As learners are completing this activity, walk around the room and check that all learners feel that they can meet the assessment criteria. Recap on any learning points that arise. Thank learners, advise on date for the next lesson and close for the day.

**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1**

Facilitator's Guide :

**Demonstrate an understanding of the
Role and Requirements of Water in Plants**

Day 2

Lesson 2 : Plant Water Needs

Notes to the Course Facilitator

At this stage of the workshop, you should have developed an informal, relaxed training atmosphere.

Lesson 2 develops the learning to meet Specific Outcome 2 and 3 of the Unit Standard

- **Identify the water requirements of the major plant types.**
- **Show an understanding of the importance of watering seedlings and newly planted (transplanted) plants.**

At the end of this lesson, learners should be able to:

- Explain the factors that influence the water requirements of plants.
- Describe the water needs of the major plant types.
- Explain the importance of frequent watering to ensure that water is available in the root zone of newly planted seedlings and transplanted plants.
- Explain the reasons why an additional frequency of watering must be conducted when root loss or disturbance in transplanting occurs.

**GENERAL CERTIFICATE IN ORNAMENTAL
HORTICULTURE LEVEL 1
Facilitator's Guide :
Demonstrate an understanding of the
Role and Requirements of Water in Plants**

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Materials required:

- Standard classroom set up (u-shape).
-