The notes are designed to be delivered with practical sessions done at NSI Ryde TAFE and practical activities to be carried out by students and submitted for evaluation as detailed in the relevant sections of the notes.

Notes compiled for AHCNSY202A: Tend Nursery Plants for use by students enrolled at NSI - Ryde TAFE.
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0.1 Unit Overview

Unit Purpose

This unit of competency enables you to tend containerised nursery plants.

This competency standard covers the process of plant maintenance and is most likely to be carried out under routine supervision with intermittent checking. Responsibility for some roles and co-ordination within a team may be required.

Competency in tending plants is demonstrated through the application of knowledge and skills to a range of plant maintenance tasks. Maintenance of nursery plants usually follows established enterprise guidelines.

Competence in tending nursery plants requires evidence that a nursery environment can be maintained, daily water requirements can be applied, plants can be treated and workplace information can be recorded.

The skills and knowledge required to tend nursery plants must be transferable to a different work environment. For example, if plants can be tended in a glasshouse, it must also be evident that plants can be tended in a shade house or hardening-off area.

This Learning Guide has been designed for use in class where your teacher will work with you through and assist you to successfully complete this unit. During classes you will be participating in activities and discussions that will provide you with additional knowledge and skills that are not covered in this guide.

Work Health & Safety (WHS)

WHS is an important part of not only this course but all of our workplaces. And we have policies in place to ensure the health and safety of everyone in TAFE including Staff, Students and Visitors. For many of your units you will be required to follow WHS requirements as part of your assessment.

You are required to:

- Wear covered footwear at all times during your attendance at TAFE.
- Wear hats and sunscreen should be worn when you are outdoors, for extended periods of time, during practical sessions and excursions.
- Obey any directions given to you by TAFE Staff.
0.2 Elements of Competency

This unit of competency consists of 3 elements. On completion this unit, you should be able to:

1. Maintain the nursery environment
2. Maintain nursery plants
3. Complete nursery plant maintenance operations

To complete these it will be necessary for you to have some underpinning knowledge and skills.

Underpinning knowledge

You require a level of knowledge and understanding to perform these tasks in the workplace and to also be able to transfer the skills to other contexts and to deal with unplanned events.

The knowledge requirements are:

- environmental requirements of a range of containerised plants growing in a nursery setting
- applied understanding of the importance of hygiene and quality control when tending nursery plants
- common problems that may occur with containerised plants in a controlled environment and their treatment
- Nursery Industry Water Management Best Practice Guidelines, 1997
- principles and operations of a range of irrigation systems used in nurseries
- methods of disposing of waste to minimise damage to the external environment.

Underpinning skills

To be able to achieve the assessment criteria, appropriate literacy and numeracy levels as well as some complementary skills are required. These include the ability to:

- participate in teams and contribute to team objectives
- read and interpret enterprise work procedures
- communicate effectively with team members and supervisor
- measure quantities and calculate application rates
- minimise noise, dust and water run-off to prevent nuisance-level environmental disturbance.
### Table 2 – Elements of Competency

<table>
<thead>
<tr>
<th>Element of Competency</th>
<th>Performance Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Maintain the nursery environment</strong></td>
<td>1.1 OHS hazards in the nursery environment are identified, risks assessed and reported to the supervisor.</td>
</tr>
<tr>
<td></td>
<td>1.2 Plant growth and health requirements are clarified with the supervisor.</td>
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<td>1.3 Irrigation system components are serviced and faulty parts are repaired or replaced.</td>
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<td>1.4 Performance parameters of the irrigation system are checked to ensure optimum performance.</td>
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<td>1.5 Temperature controls are monitored to ensure specified temperatures are maintained.</td>
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<td>1.6 Nursery hygiene practices are followed to minimise risk of contamination.</td>
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<tr>
<td><strong>2. Maintain nursery plants</strong></td>
<td>2.1 Suitable personal protective equipment (PPE) is selected, used and maintained.</td>
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<td>2.2 Common problems in nursery plants are recognised, and rectified and/or reported to the supervisor.</td>
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<td>2.3 Tools and equipment are selected and used for plant maintenance.</td>
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<td>2.4 Treatments are applied to assist plant growth as directed by the supervisor.</td>
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<td>2.5 Water is applied in the quantity and method specified by enterprise work procedures.</td>
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<td></td>
<td>2.6 Nursery operations are undertaken according to OHS requirements.</td>
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<tr>
<td><strong>3. Complete nursery plant maintenance operations</strong></td>
<td>3.1 Workplace information is recorded in the appropriate format.</td>
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<td>3.2 Waste is collected and disposed of or recycled to minimise damage to the external environment.</td>
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<td>3.3 Tools and equipment are cleaned and stored according to enterprise work procedures.</td>
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Ryde School of Horticulture

Section: Urban Horticulture

AHCNSY202A: Tend Nursery Plants

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0.3 Unit Assessment

Assessments

Your assessments for this unit will include the following Assessment Events:

Assessment 1

**Assessment Type:** Practical Demonstration

This assessment task will assess the following performance criteria:

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Assessment 2

**Assessment Type:** Record Keeping/ Diary Entries

This assessment task will assess the following performance criteria:

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Assessment 3

**Assessment Type:** Observation and class participation

This assessment task will assess the following performance criteria:

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Topic 1
Maintain the nursery environment
1.1 Introduction

The work procedures that you follow to maintain the nursery environment will be based on sound horticultural principles and practices and may include:

- supervisors oral or written instructions,
- the Nursery Industry Accreditation Scheme,
- plant care programs,
- enterprise standard operating procedures (SOPs),
- specifications,
- production schedules,
- routine maintenance schedules,
- work notes,
- product labels, and Material Safety Data Sheets (MSDSs);
- Integrated Pest Management (IPM) programs;
- manufacturers service specifications and operators manuals;
- waste disposal, recycling and re-use guidelines; and
- OHS procedures.
1.2 WHS hazards

WHS hazards in the nursery environment must be:

- identified,
- risks assessed and
- reported to the supervisor.

What WHS hazards are in nursery environment?

Hazards in the nursery environment may include:

- use of chemicals and hazardous substances,
- sharp tools,
- manual handling,
- solar radiation and
- operating spray equipment.

The nursery environment may include:

- glasshouses,
- shade houses and
- hardening-off areas.
1.3 Determine plant requirements

Through your studies and learning you will have gained knowledge of what plants require to grow and remain healthy. In general terms these are always the same but some individual plant species may require specific requirements. For instance, while all species need water some will require more or less than other species.

You will need to determine the requirements for the plants in your workplace/nursery by consulting with your supervisor.

Plant growth requirements may include:

- watering,
- light levels,
- fertiliser regime,
- pruning and shaping,
- repotting, and
- staking.

Once you have determined the requirements of the plants you can then decide what treatments need to be applied to the plants so that they can achieve optimum levels of growth.

Notes:
1.4 Maintain irrigation systems

One of the most important tasks in a nursery is to make sure that all the plants are correctly watered. The majority of watering with a nursery is usually carried out using an automatic irrigation system with hand watering being used only occasionally.

Water is essential to plant growth so it is necessary to ensure that your irrigation system is delivering the correct amount of water to each plant. A well designed irrigation system will allow you to put on the correct amount of water but only if it is serviced and maintained correctly.

Types of nursery irrigation systems may include:

- ebb and flow,
- sprinklers,
- capillary beds,
- sprayers and
- drippers.

One nursery will often use a number of different systems to cater for the different environments and plant requirements. These different systems may be independent of each other or they may be part of a larger overall system where they share major components or supply source.

The components of the irrigation system may include:

- pumps,
- lines or pipes,
- sprinklers,
- sprinkler heads,
- solenoids,
- filters,
- controllers,
- sprayers and
- drippers.

To keep irrigation systems working correctly it is vital that they be maintained. Failure to maintain equipment in good working order can lead to the following:

- inefficient and wasteful use of water
- uneven watering pattern with some areas receiving more water than others.
- blocked drippers with some areas receiving no water
- clogged filters reducing flow rates
- pumps cavitating and causing undue wear and tear
- poor plant growth and in some cases death.
Maintenance

Maintenance of an irrigation system includes:

- servicing components and
- monitoring the system performance and the water status of the growing media.

Servicing

Apart from fixing obvious problems such as leaks and breakdowns, there should be a regular servicing schedule. This could be in the form of a calendar or diary with entries for weekly, monthly or even yearly servicing. This is similar to the regular services that you would carry out on your car or any other piece of machinery.

Service intervals

The service intervals will vary depending on:

- water quality
- type of component
- manufacturer’s recommendation and
- frequency of use.

Servicing procedures may include:

- cleaning filters (eg. system filters and filters in sprinkler heads)
- pump and motor servicing as per the manufacturer’s instructions.
- replacement of backup batteries in controllers.

Monitoring

Monitoring of the system includes performing visual and physical checks to ensure that the system is performing to its optimum.

Physical checks may include testing pressure at various points, checking water flow and usage figures, checking precipitation rates and soil/media moisture tests.

Visual checks may include identifying dry spots and blockages, water dumping, and leaking heads, lines and pipes

Close visual monitoring of the plants on a daily basis will allow you to quickly see if there is a problem with the irrigation system or the way in which it is programmed. This should become an integral part of everybody’s daily activities and when a plant, or plants, are water stressed they should be treated immediately by hand watering. Once this is done, you can then set about finding out the cause.
Causes of under-watering

- irrigation system not delivering enough water may be due to:
  - low pressure (broken pipe, leaks, supply problems, blocked filters)
  - water scheduling (programming)
  - blocked sprinkler or dripper nozzles
  - wind causing spray drift
- changes to weather conditions (increased temperatures and lower humidity)
- beds containing stock at different stages of growth and in different sized pots
- plants that have been blown over
- sprinkler shadows caused by larger stock

Over-watering may not kill plants but water is a valuable resource. Over-watering will:

- waste water
- leach nutrients out of the media
- increase the costs for pumping, water and fertiliser
- cause poor root development and disease in some plants.

Causes of over-watering

- irrigation system is not programmed to match the size and type of stock
- changes to weather conditions (rain)
- faulty sprinklers
- faulty solenoids
1.5 Monitor temperature controls

All plants have a range of temperature, within which, they can reach optimum growth if all other requirements of the plant are met.

If the temperatures are outside the optimum range the following may happen:

- growth rate will slow down
- seeds will not germinate
- flowering may not occur
- plant tissue may die, leading to leaf burn or total death of the plant.

The monitoring of temperatures can be done by using thermometers. There are many types of thermometers that you can use for monitoring air and soil/media temperatures, including:

- maximum/minimum thermometers (air temperature)
- mercury, alcohol or dial thermometers (soil temperature)
- electronic sensors which can be stand alone or part of a controlled environment system.

Controlling temperature

Temperature of the air and soil can be controlled manually or by an automated system.

**Air temperature** can be controlled by:

- changing the percentage of shade
- syringing with the irrigation system (high temperatures and frost prevention)
- operating heating, cooling and ventilation systems

**Soil temperature** can be controlled by:

- changing air temperature
- changing thermostat controls on bottom heat systems
1.6 Maintain nursery hygiene

Hygiene standards should be practiced, not only by personnel working in nurseries, but by all horticulturists in whatever field they are employed. Hygiene control has to be continually observed from the start of production to final planting, and during the ongoing maintenance to minimise risk of contamination.

Hygiene practices may include:

- removing weeds, dead or diseased plant material;
- washing the work area on transfer of plants;
- disinfecting tools, equipment and work areas, and
- using foot baths on entry to different work areas.

Notes:
Topic 2
Maintain nursery plants
2.1 Follow WHS guidelines

All work must be undertaken according to requirements of the WHS Act and the your workplace guidelines.

WHS requirements may include:

- identifying hazards, assessing and reporting risks,
- cleaning, maintaining and storing tools and equipment,
- select use and maintain appropriate personal protective equipment including:
  - hat,
  - boots,
  - overalls,
  - gloves,
  - sunscreen lotion,
  - goggles,
  - face mask,
  - respirator,
  - spray jacket or suit.
- safe operation of tools and equipment,
- safe handling, use and storage of chemicals and hazardous substances,
- correct manual handling,
- basic first aid,
- personal hygiene and
- reporting problems to supervisors.
2.2 Monitor plant health

Close monitoring of nursery plants will allow you to recognise problems while they are in their early stages. This is important because it means that the plants are less likely to suffer major damage or injury and that infestations of pests and diseases can be controlled with relative ease before they reach plague proportions.

When you observe a problem it must be rectified and/or reported to the supervisor. This will depend on your workplace guidelines.

Types of plants

The types of nursery plants that you may be dealing with include:

- containerised,
- balled and bagged,
- in-ground, aquatic,
- stock plants,
- cuttings and
- rootlings.

Common problems

Keep your eyes open so that you can easily and quickly recognise common problems while performing any routine maintenance tasks.

Common problems that may be encountered include:

- dehydration,
- pests,
- diseases,
- nutrient deficiencies and
- deformed plants.

Rectify or report

Once you have recognised a problem you should then either rectify the problem by applying the appropriate treatment or report the problem to your supervisor.
2.3 Tools & equipment

There are many tools and equipment that you will have in the nursery to perform the various tasks required to maintain the plants.

The tools and equipment that you use will be determined by the task that you are undertaking. For instance the tools and equipment required for weeding will be quite different to those required for propagation.

Regardless of what you are using you should always use tools and equipment:

- for the purpose for which it was intended
- according to manufacturers instructions and workplace guidelines
- in a safe manner.

Notes:
2.4 Apply and/or perform treatments

From time to time treatments need to be applied to assist plant growth. These tasks are most likely to make a major part of your daily routine and must be carried out according to your supervisor’s instructions.

The treatments that need to be applied may include:

- pesticides,
- fungicides,
- fertiliser,
- mulching,
- removing weeds,
- removing dead material,
- tip pruning,
- formative pruning,
- aeration,
- staking, tying, spacing and thinning.
2.5 Water plants

Watering is more important than generally realised. Frequent watering is not necessarily a virtue and can spoil or badly train plants by encouraging a concentration of surface roots. These roots become dependent on surface watering which makes them exceptionally vulnerable to damage during hot and dry periods. It is far better to water only when the surface of the soil dries out. The exception to this is newly planted plants especially young seedlings or other plants which have shallow root systems. Normally you would let the dryness extend down 3 to 4 cm before you water, then give a thorough soaking. This treatment encourages plant roots to grow deeper and so they are able to survive dry periods better than the shallow rooted plants.

Your workplace may have specific guidelines on how, when and how much to water.

How much water to apply

Having decided to water your plants, how much water should you apply? The answer is not easy and will depend upon a number of factors such as:

- time of year
- time of day
- plant species (how much water does the plant need for optimum growth)
- media – is it well drained or poorly drained?
- size of the container, type of container
- size of garden beds,
- number of plant roots in the soil

Deciding when to water

No one can suggest just how often you need to water, it depends upon all of the above factors. After you get to know your plants you will have some idea of water needs by the appearance of the plant, but remember it is good training for the plant to remain dry for a while before watering.

Nursery beds

For nursery beds (open ground beds), remove the mulch and fossick down with a trowel to check the appearance of the soil for moisture to establish the need for watering. If you have agricultural pipes laid for drainage, watch the outlets and if water is beginning to run you know the soil is thoroughly wet.
Containers

- Look at the surface of the media in the container. If it is obviously moist there is no need to water.

- Sometimes the surface of the media can look dry, but the media is moist underneath. Therefore, if the media appears to be dry, or only slightly moist, dig down into the media a couple of centimetres to feel what it is like. If it is dry this far down, you need to water. If it is moist then it can probably wait another day.

- One of the best ways to determine if plants in small containers need water is to feel the weight of the container, the lighter it is the drier it is.

- For large pots which cannot be lifted, tap the side of the container, a hollow sound usually indicates a need to water.

- Hanging baskets that are lined with coconut fibre, bark or synthetic materials, will need watering when the bottom of the baskets feels dry.

Less satisfactory methods for determining when a plant (in a container) needs watering include:

- waiting until the plant wilts. While most plants survive the occasional mild wilting, prolonged or frequent wilting will reduce the growth rate, cause leaf edges to dry off and die cause the top parts of the shoots to die and can damage the roots of many plants. However, check the wetness of the media before watering, if it is wet and the plant is wilting, it usually means that the roots are damaged, or diseased. Under these circumstances, withhold water and the plant may recover (if damaged) or need to be treated (if diseased).

- knocking the plant from the container to see the wetness of the rootball, this is tedious and messy although it is sometimes used by nursery staff as an occasional check

- just water every day to avoid the problem. This may be satisfactory in summer for outdoor plants, but in cooler weather constantly wet media can lead to rotting of roots.

- using probes to determine the wetness of the media, the use of probes can be misleading and are often inaccurate mainly because the amount of fertiliser in the media will affect the reading.
## Topic 3
Complete nursery plant maintenance operations

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<tr>
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<td>Seeding where needed</td>
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<tr>
<td>Winter Clean up</td>
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</table>
3.1 Maintain records

Records are an important part of all the tasks that you undertake in your workplace. Details of your work should be recorded or reported to the supervisor according to enterprise work procedures.

These records may include:

- All the information appropriate to plant health problems and treatments that are applied
- Climatic records including temperature and rainfall
- Service and maintenance records for irrigation systems, nursery structures, tools and equipment

Records are kept so that:

- We can identify trends so that we can better anticipate problems
- Identify problems and poor methods so that we can make improvements
- Information is kept and shared

If your records are to be useful they need to be completed accurately and on a regular basis. You may find that even at the end of the day you have already forgotten something. You may find it useful to keep brief notes during the day and completing the main records in more detail at the end of the day.

Notes:
### 3.2 Waste disposal

At the end of each day when the nursery operations have been completed then it is time to clean up and store the equipment and to dispose of any waste. This should be completed promptly and thoroughly to ensure:

- the area is safe
- tools and equipment are ready for the next task and
- the work area is maintained in a hygienic manner.

#### Tools and Equipment

All tools and equipment should be checked to see if any servicing or maintenance is required. Any maintenance can then be carried out and the equipment stored ready for use next time.

#### Waste

All waste should be collected and disposed of or recycled to minimise damage to the external environment.

Waste may include:

- left over treatments,
- unused containers,
- plant debris or
- faulty irrigation components.

Environmental implications may include:

- contamination of off-site ground water or soils from solids,
- nursery debris, nutrients or chemicals.