

**Ministry of Education  
Curriculum Planning and Development Division**

**Level: Forms 4 & 5**

***CVQ Level 1 – Crop Production - Grow Box Operations***

Unit Code	Unit Title	Mandatory/ Elective
AG00656	Prepare Grow Box for Planting	Mandatory

**Unit Descriptor:**

**This unit deals with the skills and knowledge required for preparing a Grow Box for planting. It describes the work expectations associated with preparing the growing medium and filling the grow box with the prepared growing medium.**

<b>ELEMENTS</b> <i>Candidates must be able to:</i>	<b>PERFORMANCE CRITERIA</b>
1 Prepare growing medium	1.1 Wear suitable personal protective equipment while preparing the site and constructing a grow box
	1.2 Select suitable materials for preparing the growing medium following supervisor's instructions
	1.3 Measure the materials according to the specifications given by the supervisor
	1.4 Mix the materials as instructed by supervisor

# Preparing the growing medium

# Personal Protective Equipment (PPE)

- ▶ Coveralls
- ▶ Steel-tip boots
- ▶ Gloves
- ▶ Helmet
- ▶ Goggles
- ▶ Hat



Source: <https://www.omrindustryjournal.com/personal-protective-equipment-ppe>

## Materials

- Saw dust
- Bagasse
- Rice hulls
- Pro-mix
- Sharp sand

## Equipment

- Hoe
- Shovel
- Bucket
- Wheelbarrow
- Rake
- Spray can

## Chemicals

- Limestone
- Pre-plant fertilizer
- Soil insecticide
- Soil fumigant

# What different materials are used in the preparation of the growing medium?

Material	Description
Saw dust	Powdery particles of wood produced during sawing.
Bagasse	The fibrous pulp that remains after sugar cane has been crushed and the juice extracted.
Rice hulls	The hard protective outer covering of the rice grain.
Pro-mix	A type of commercial potting soil.
Sharp sand	Sharp sand, also known as grit sand or river sand and as builders' sand when medium or coarse grain, is a gritty sand used in concrete and potting soil mixes or to loosen clay soil as well as for building projects.
Plastering sand	Plastering Sand is a very fine grade of sand. This product is used for plastering and creating renders both internally and externally during construction projects.

# Functions of the growing medium

► Growing medium has a 2 main functions:-

1) Supports the plant by giving the plant roots anchorage.

2) Supplies the roots with water, nutrients and air.

# Desirable characteristics of the growing medium

1. Allows the plant roots to grow freely in between the particles of the material.
2. Allows air and water to travel through the pore spaces.
3. Able to hold enough water and nutrients to keep plants healthy.
4. Allows excess water to drain away easily and prevent waterlogging.
5. Free from weeds, pests, and diseases.

# Measuring the materials for the growing medium

- ▶ Depending on the size of the grow box, the amount of material required to fill the grow box can be determined.
- ▶ This is done by calculating the volume of the grow box and the volume of the wheelbarrow used to fill the grow box.

# Calculating the volume of the grow box and the wheelbarrow

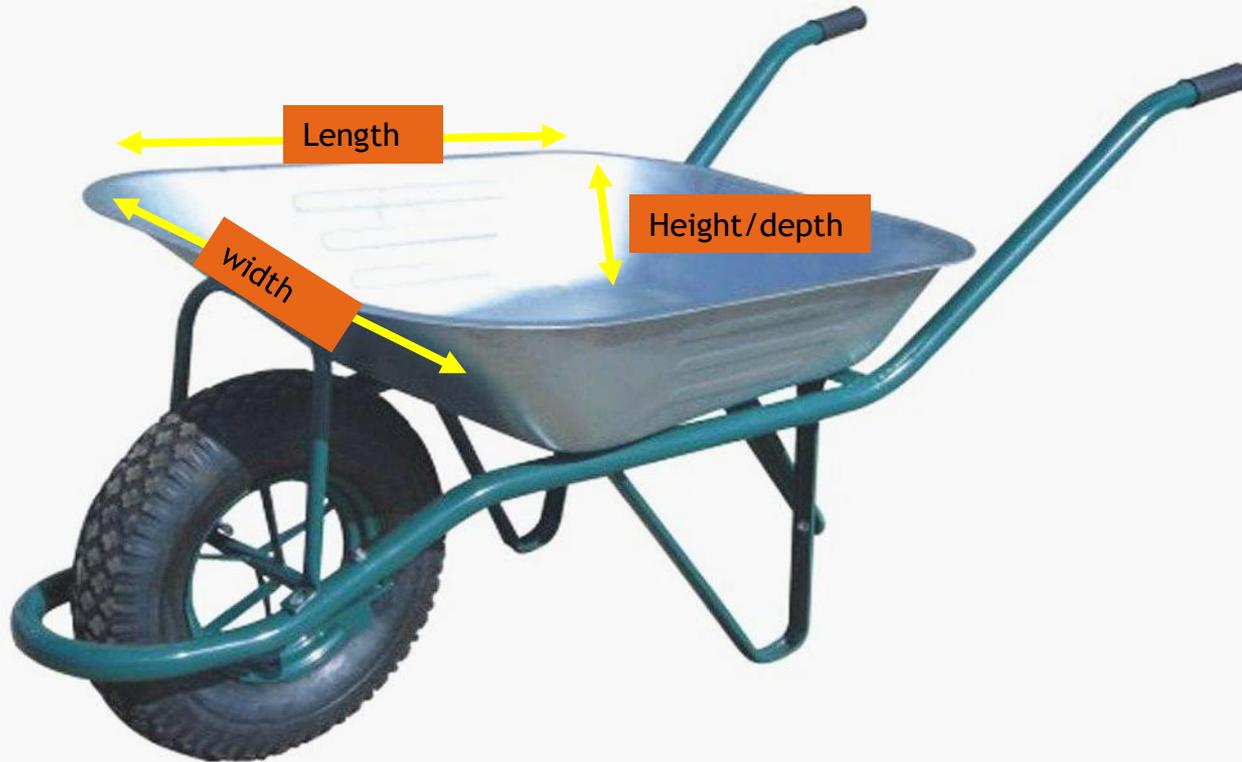
- ▶ If the size of the grow box is 90 cm wide by 300cm long by 20 cm in height then:
- ▶  $\text{VOLUME} = \text{length} \times \text{width} \times \text{height}$   
 $= 300\text{cm} \times 90\text{cm} \times 20\text{cm}$  (i.e. height of concrete block)  
 $= 540000 \text{ cm}^3$  or  $.54\text{m}^3$
- ▶ Use the same method to calculate the volume of the wheelbarrow
- ▶ Divide the volume of the grow box by the volume of the wheelbarrow. This will indicate approximately how many barrows of material will be required to fill the grow box.

# Calculating the Volume of the Grow box



► VOLUME = length X width X height

# Calculating the Volume of the Wheelbarrow



▶ VOLUME = length X width X height

▶ NOTE: This is an approximation as the wheelbarrow is not a perfect shape

# Calculating the volume of the grow box and the wheelbarrow- WORKED EXAMPLE

- ▶ If the size of the grow box is 90 cm wide by 150cm long by 20 cm in height then:
- ▶ VOLUME of GROW BOX = length X width X height  
= 150cm X 90cm X 20cm (i.e. height of concrete block)  
= 270000 cm<sup>3</sup> or 0.27m<sup>3</sup>

Use the same method to calculate the volume of the wheelbarrow

- ▶ VOLUME of WHEEL BARROW = length X width X height  
= 68cm X 68cm X 18cm  
= 83232 cm<sup>3</sup>
- ▶ Divide the volume of the grow box by the volume of the wheelbarrow:  
= 270000/83232  
= 3.25

Approximately 3.25 wheelbarrows of material is needed to fill a grow box with the dimensions of 150x90x20

# Transporting the growing material to the Grow box



**Correct Posture**



**Incorrect Posture**

Source: <https://gardenever.com/wheelbarrow-handling-tips-handle-wheelbarrow-best-way/>

- ▶ When transporting the growing medium ensure the wheelbarrow is not overfilled and become too heavy and proper lifting posture is maintained while using the wheelbarrow.

# Proportions of materials used in growing medium

Material	Quantity
Main growing medium e.g. Saw dust, Promix, Rice hulls or Bagasse	3 wheelbarrows
Sharp sand	1 wheelbarrow
Limestone	226 g
Pre-plant fertilizer e.g. 12:24:12	300 g
Soil insecticide e.g. Fastac	15ml
Soil fumigant e.g. Midas	10 ml

# What are the reasons for preparing the growing medium?

- ▶ The growing medium helps provide plants' roots with the moisture and oxygen they need. It also supports the plant weight and holds the plant upright. Another role of the medium is to allow plant's roots to have maximum exposure to nutrients.

# How to prepare the growing medium?

1. Measure ALL required materials for the mixture.
2. Spread the soilless growing media on a clean concrete area, as close to the grow box as possible.
3. Spread the sharp sand on top of the soilless material.
4. Sprinkle the other materials as evenly as possible over the soilless material and sharp sand.
5. Mix thoroughly with a shovel

# Measuring the materials for the growing medium



Source: <https://thegrowbox.blogspot.com/2015/01/filling-grow-box-with-soilless-growing.html>

- ▶ Measure materials such as limestone and pre-plant fertilizers using a measuring scale

# Mixing materials used in growing medium

- ▶ Measure ALL required materials for the mixture.
- ▶ Spread the soilless growing media on a clean concrete area, as close to the grow box as possible.
- ▶ Spread the sharp sand on top of the soilless material.
- ▶ Sprinkle the other materials as evenly as possible over the soilless material and sharp sand.



Source: <https://thegrowbox.blogspot.com/2015/01/filling-grow-box-with-soilless-growing.html>

# Mixing materials used in growing medium



Source: <https://thegrowbox.blogspot.com/2015/01/filling-grow-box-with-soilless-growing.html>

- ▶ Mix the materials thoroughly using a shovel.

# EVALUATION

1. What are different materials, equipment and chemicals used in the preparation of the growing medium?
2. What are the procedures used for measuring materials to be used to make the growing medium?
3. List the steps in preparing the growing medium.
4. Calculate the volume of growing medium needed to fill the grow boxes with the following dimensions:
  1. 150 cm long by 60 cm wide by 20 cm in height
  2. 75 cm long by 60 cm wide by 20 cm in height

# ANSWERS

1. What are different materials, equipment and chemicals used in the preparation of the growing medium?

Materials	Equipment	Chemicals
<ul style="list-style-type: none"><li>• Saw dust</li><li>• Bagasse</li><li>• Rice hulls</li><li>• Pro-mix</li><li>• Sharp sand</li></ul>	<ul style="list-style-type: none"><li>• Hoe</li><li>• Shovel</li><li>• Bucket</li><li>• Wheelbarrow</li><li>• Rake</li><li>• Spray can</li></ul>	<ul style="list-style-type: none"><li>• Limestone</li><li>• Pre-plant fertilizer</li><li>• Soil insecticide</li><li>• Soil fumigant</li></ul>

# ANSWERS

2. What are the procedures used for measuring materials to be used to make the growing medium?

Depending on the size of the grow box, the amount of material required to fill the grow box can be determined.

This is done by calculating the volume of the grow box and the volume of the wheelbarrow used to fill the grow box and dividing the volume of the grow box by the volume of the wheelbarrow.

# ANSWERS

3. List the steps in preparing the growing medium.

1. Measure ALL required materials for the mixture.
2. Spread the soilless growing media on a clean concrete area, as close to the grow box as possible.
3. Spread the sharp sand on top of the soilless material.
4. Sprinkle the other materials as evenly as possible over the soilless material and sharp sand.
5. Mix thoroughly with a shovel

# ANSWERS

4. Calculate the volume of growing medium needed to fill the grow boxes with the following dimensions:

1. 150 cm long by 60 cm wide by 20 cm in height

$$\begin{aligned}\text{VOLUME of GROW BOX} &= \text{length} \times \text{width} \times \text{height} \\ &= 150\text{cm} \times 60\text{cm} \times 20\text{cm} \\ &= \underline{180000 \text{ cm}^3 \text{ or } 0.18\text{m}^3}\end{aligned}$$

2. 75 cm long by 60 cm wide by 20 cm in height

$$\begin{aligned}\text{VOLUME of GROW BOX} &= \text{length} \times \text{width} \times \text{height} \\ &= 75\text{cm} \times 60\text{cm} \times 20\text{cm} \\ &= \underline{90000 \text{ cm}^3 \text{ or } 0.09\text{m}^3}\end{aligned}$$

# References

- ▶ The Grow Box
  - ▶ Retrieved from : <https://thegrowbox.blogspot.com/>