



NQF Level: 1

US No: 116206

# Assessment Guide

## Primary Agriculture

# Fertilise Soil & Attend to Basic Plant Nutrition



Assessor: .....

Workplace / Company: .....

Commodity: ..... Date: .....

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agriculture

Department:  
Agriculture  
REPUBLIC OF SOUTH AFRICA







## 1.1

SO 1 AC 1 - 2

### Instructions to Learner:

Complete the following research & observation sheet.

Learner Workbook: Page 3

Facilitator Guide: Page 11 - 12

Choose a type of Crop that you produce on your farm. What is it?	Any E.g. Vineyard; Deciduous Fruit
<b>For this type of crop – Answer the following questions:</b>	
What types of soils are most appropriate?	E.g. Vines: Any suitable as long as it is prepared & chemically adjusted correctly & correct rootstocks are chosen for the soil/climate.
Name 5 steps you would take prior to planting any one plant of this type.	1. Analyse & record climate, slope, height above sea-level, climate, weather
	2. Look at natural vegetation & invasive species Develop means to retain natural fauna & flora & eradicate invaders
	3. Determine available water sources Erect means to get water to plants
	4. Analyse soil chemically & physically & adjust accordingly
	5. Determine if the crop to be planted is ecologically allowed, economically viable Establish an infra-structure
What types of nutrients would be necessary for optimum growth of this crop?	N, P, K Micro-elements such as Iron, Magnesium, Calcium
How would you know if there were enough of these nutrients in the soil for your crop?	Through professional soil analyses reports
If any nutrient/s are short, how would you know how much of that nutrient to add?	Through professional soil analyses reports & the interpretation thereof
Explain what a soil profile is, how it will be made and why it is done.	<b>Definition:</b> A vertical cut into the soil exposing the various layers or horizons and their make-up <b>How to make it:</b> Dig a trench about 1m deep and 0'5m wide <b>Why is it done:</b> To determine physical & chemical barriers or

	<p>deficiencies in soil To classify soil in terms of its agricultural suitability To determine effective soil depth</p>
<p>Tick (✓) off which of the following has been added to your farm's crop in the last 6-12 months.</p>	<p>Can be any; be sure the correct method is applied for the type of fertilizer</p> <ul style="list-style-type: none"> <li>Lime</li> <li>Liquid fertiliser</li> <li>Chemical fertilisers single</li> <li>Chemical fertilizer mixtures</li> <li>Organic compost</li> <li>Potassium</li> <li>Nitrogen</li> </ul>
<p>Say why it was done.</p>	<p><b>Lime:</b> Correct pH <b>Liquid fertilizer:</b> Meet deficiency <b>Chemical fertilizer single:</b> Add specific deficient mineral <b>Chemical fertilizer mix:</b> Add combination of deficient or interdependent fertilizers <b>Organic compost:</b> Correct soil structure, aid against soil acidity, supply organic nutrient to soil, enrich soil organically <b>Potassium:</b> Supplement potassium deficiency <b>Nitrogen:</b> Improve vegetative growth</p>
<p>Say what method was used to apply it.</p>	<p>Could be any; be sure that compost is not shown to be applied in line but physically</p>
<p>Name 2 other methods that could be used to apply fertilizer (possibly for other crops).</p>	<p>1. Any 2 other methods not mentioned above</p>
	<p>2. Any 2 other methods not mentioned above</p>
<p>Name the most important nutrient required for this crop and explain what the function of each mineral is.</p>	<p>N, P, K, Mg, Ca and S Specific micro-elements according to crop requirements</p>
<p>Name the macro-elements required for your crop.</p>	<p>N, P, K, Mg, Ca and S</p>
<p>Name the micro-elements required for your crop.</p>	<p>Fe, B, Zn, Cu, Manganes, Molybdenum...</p>
<p>Say what symptoms you might see in your type of crop if you put too much or too little fertilizer on it. (Where possible refer to specific minerals).</p>	<p><b>Too much:</b> Chlorotic Burning on leaf edges, coppering of growth-point, excessive vigour in comparison to fruit production, misshapen fruit <b>Too little:</b> Retarded growth, paling of leaves, toxicity symptoms due to other minerals being out of balance.</p>



**1.3****SO 1 AC 1 - 2****Instructions to Learner:**

Discuss with your group...

**Learner Workbook: Page 7****Facilitator Guide: Page 11 - 12****1. What is mulch and why would we apply it?****Model Answer(s):**

A protective layer of material spread on top of the soil  
Rough vegetative matter, pips (organic), or stones, plastic and brick chips (inorganic)  
spread over the soil surface  
Applied to retain soil moisture  
Protects soil from erosion  
Reduces compaction in clay soils during heavy rain  
Maintains a more even soil temperature  
Suppresses weed growth  
Keeps fruit & vegetable clean, promoting food safety  
Can assist in a "landscaped" or tidy look to the garden

**2. What are the advantages of mulching?****Model Answer(s):**

Retains soil moisture  
Protects soil from erosion  
Reduces compaction in clay soils during heavy rain  
Maintains a more even soil temperature  
Suppresses weed growth  
Keeps fruit & vegetable clean, promoting food safety  
Can assist in a "landscaped" or tidy look to the garden

**3. Is it possible to make your own mulch? How?****Model Answer(s):**

Yes  
Chipping or composting vegetative matter or shaving untreated wood or breaking up  
bricks or boulders and spreading it over the soil surface or around plants

# 1.4

SO 1 AC 1 - 2

### Instructions to Learner:

Research and discover...

Learner Workbook: Page 8

Facilitator Guide: Page 11 - 12

1. Explain what you understand under the following methods of fertilizer application and give an example of a fertilizer that is applied this way each time.

- a. Manual

**Model Answer(s):**

Physically working fertilizer into the soil or applying it on the soil surface, e.g. throwing down salt crystals, granules or working in compost

- b. Broadcast

**Model Answer(s):**

Uniformly applying the fertilizer over the entire area before planting using mechanical spreaders and then working the fertilizer into the soil to a depth of 10-15cm. e.g. lime and compost

- c. Liquid methods

**Model Answer(s):**

Dissolving fertilizer in water & applying it in liquid form, e.g. pre-mixed liquid fertilizers or fertilizers applied through the dripper irrigation system

- d. Leaf nutrition

**Model Answer(s):**

Applying fertilizer (in liquid form) to the foliage with the aid of spray-pumps, e.g. Kelp; Seagrow; Any foliar fertilizer brand name

- e. Slurry

**Model Answer(s):**

Refers to a method by which the fertilizer is too dry to be applied evenly or consistently, and it is thus mixed with water to make it more spread able. Mostly used for organic fertilizers. The manure is often mixed with wood shavings or sawdust and the wet slurry is then spread over a large area or specifically around single plants. It adds great value in terms of Nitrogen contribution. Most effective for crops such as legumes and grasses, e.g. Chicken manure or guano



## 1.5

SO 1 AC 1 - 2

**Instructions to Learner:**  
Find 1 type of Liquid Fertilizer on you farm.

**Learner Workbook: Page 9      Facilitator Guide: Page 11 - 12**

1. Get a copy of the instructions for application and write it down here. List the active ingredients and explain what the purpose of each mineral is in the plant.

**Model Answer(s):**  
Check accuracy of mixing instructions

2. Now explain how the fertilizer has to be mixed and what will happen if it is mixed incorrectly.

**Model Answer(s):**  
Check accuracy of mixing instructions  
Incorrect mixing might render fertiliser useless or be dangerous to human health due to flammability or explosive nature

3. Now explain how you will measure off the correct amount of the fertilizer for mixing.

**Model Answer(s):**  
Calibrate scales  
Weigh/measure accurately regarding fertiliser & solvents  
When working with liquids, check accuracy of reading on meniscus of measuring jug

4. Now explain how to apply the fertilizer (name the equipment and conditions such as not applying it in windy conditions).

**Model Answer(s):**  
Check accuracy of application instructions  
Ensure no application in adverse weather  
Notify labour teams prior to application to ensure they move out of the area  
Calibrate sprayer, set pressure gages and turn spray nozzles as instructed

**My Notes ...**

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**1.6**  
**SO 1 AC 1 - 2**

**Instructions to Learner:**

Answer the following questions:

**Learner Workbook: Page 10      Facilitator Guide: Page 11 - 12**

1. Why do you think it is necessary to be accurate when mixing fertilizer?

**Model Answer(s):**  
To prevent the application of too little or too much of specific minerals  
To ensure Health & Safety during mixing & application

2. Name 4 important safety precautions you should take when working with fertilizer.

**Model Answer(s):**  
Wear rubber gloves, eye protection, boots, overall while mixing & applying  
Store fertilizers in a separate room & separate from each other if there is a risk of chemical reaction between them  
Never apply fertilizers without consulting a professional  
Be absolutely certain to mix accurately & according to instructions & discard of excesses as per instruction/as per environmental law

3. Name 4 pieces of safety clothing or equipment that you should use when applying fertilizer.

**Model Answer(s):**  
Rubber Gloves  
Eye protection  
Over-all  
Safety boots or rubber boots

**My Notes ...**

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## 2.1

**SO 2 AC 1 - 3**

### Instructions to Learner:

As part of your assessment, you are required to make your own compost over a matter of 2 – 3 months and you will be inter-viewed by an assessor and asked questions regarding the following:

**Learner Workbook: Page 11**

**Facilitator Guide: Page 13 - 14**

**1. What is Compost?**

**Model Answer(s):**

Organic matter that has decomposed & is added as organic fertilizer to soil

**2. Why would you make it / use it?**

**Model Answer(s):**

It is a cheap method that can be home prepared

It aids in recycling

It improves soil fertility and soil structure

**3. Name 5 things that you added to your compost heap.**

**Model Answer(s):**

Leaves, twigs, wood shavings, vegetable rests, teabags, manure, grass cuttings, garden rubble, pips, fruit skins

**4. What is the role of Micro-organisms in Compost?**

**Model Answer(s):**

They are responsible for the decomposing of the organic matter

**5. Say why you would need any ingredients that has the following:**

**a. Carbon**

**Model Answer(s):**

Carbon (from organic matter like leaves) provides the food for micro-organisms.

**b. Nitrogen**

**Model Answer(s):**

Nitrogen) comes from N-containing fertiliser, grass clippings and dead green plants and provides the energy microorganisms need to break down the organic material

**c. Water and oxygen**

**Model Answer(s):**

Water and oxygen, which micro-organisms need lots of to survive and do their job.

6. Now give an example of a material you added that would contribute – Nitrogen.

**Model Answer(s):**

Grass cuttings, lupines, beans many kinds of soft green laves, Nitrogen fertiliser

7. Now give an example of a material you added that would contribute – Carbon.

**Model Answer(s):**

Any organic material like twigs, wood shavings, leaves or animal material

8. Complete the following table:

Compost Troubleshooting Guide		
Problem	Possible Causes	Solutions
Rotten Odour	Excess moisture (anaerobic conditions)	Turn pile, or add dry, porous material, such as sawdust, wood chips, or straw
	Compaction (anaerobic conditions)	Turn pile, or make pile smaller
Ammonia Odour	Excess moisture too much nitrogen (lack of carbon)	Turn pile Add high carbon material, such as sawdust, wood chips, or straw
Low Pile Temperature	Pile too small	Make pile bigger or insulate sides
	Insufficient moisture	Add water while turning pile
	Poor aeration	Turn pile
	Lack of nitrogen	Mix in nitrogen sources such as grass clippings or manure
High Pile Temperature (greater than 60 degrees CCC Fahrenheit)	Cold weather	Increase pile size, or insulate pile with an extra layer of material such as straw
	Make pile bigger or insulate sides	Reduce pile size
Pests: rats, insects	Presence of meat scraps or fatty food waste	Add water while turning pile
		Turn pile
		Remove meat and fatty foods from pile, or cover with a layer of soil or sawdust, or build an animal-proof compost bin, or turn the pile to increase temperature

9. Say how to store manure so that nutrients are not lost

**Model Answer(s):**

Store in cone-bin/empty garbage bin with aeration, sisal bags

10. How will you know when the compost is ready to use?

**Model Answer(s):**

Most of the material is decomposed & the compost has a sweet smell to it

11. What will happen if you left the compost too long?

**Model Answer(s):**

The nutrients will be lost or leached & the compost will be ineffective

## 4.1

SO 4 AC 1 - 3

### Instructions to Learner:

Under guidance from the facilitator, make notes for yourself...

Learner Workbook: Page 13

Facilitator Guide: Page 16 - 17

1. What soil basically consists of.

**Model Answer(s):**

Minerals; Water; Air; Organic matter; Stones or rocks; Various textures of soil; Microbes; insects

2. What the organic content of soil is.

**Model Answer(s):**

Anything that is in the soil that used to be alive and is now decomposing, e.g. dead plant roots, dead vegetation or animal remains or faeces pulled into the soil by insects

3. What soil consistency is.

**Model Answer(s):**

The feel of the soil  
It reflects the relative resistance to pressure, e.g. it's friable, firm, hard, loose or plastic  
Specifically related to water holding capacity as measured under mechanical stresses and manipulations

4. What soil texture is.

**Model Answer(s):**

The way that soil feels  
It depends on the amount, size and type of each particle in the soil, e.g. sand has the largest particles and feels gritty; silt have medium sized particles and feel soft, silky and floury, clay have the smallest particles and feel sticky and hard to squeeze

5. What water holding capacity of soil is.

**Model Answer(s):**

How much water the soil retains or holds onto in the profile or soil horizon

6. What water drainage ability of soil is.

**Model Answer(s):**

How much water the soil lets through or leaches out of the profile or horizon



## 4.2

SO 4 AC 1 - 3

### Instructions to Learner:

Find samples of 3 different soil types and attach them in your workbook (you can place a little of each in a small plastic bag). Then answer the questions regarding each type.

**Learner Workbook: Page 14**

**Facilitator Guide: Page 16 - 17**

1. Include a sample or explanation of what structure-less soil is and what the disadvantages of structure-less soil is under "example 4".

Soil Sample 1	Type of Soil	Sand
Paste the sample here:	Texture of this soil type	Course
	Structure of this soil type	Crystalline & angular
	Water holding / Drainage capacity of this soil type	High water penetration, high drainage, low water holding capacity
	Colour of the soil	Pale yellow to white
	What the colour of this soil tells us.	Low nutrient value Low organic content Leached soil
	Possible Organic components of this soil	Very little organic matter, some minerals to be found, mostly made up of silicates
	Suitability for plants such as Vines or Deciduous Fruit Trees on a scale 1 to 10 (1 least suitable & 10 most suitable)	2-3 Can be improved through use of correct rootstocks & physical & chemical improvements of soil

### My Notes ...

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Soil Sample 2	Type of Soil	Loam
<b>Paste the sample here:</b>	Texture of this soil type	Smooth with some coarse bits, but less coarse than sand
	Structure of this soil type	Some crystalline structures, some plate-like structures, some angular structures
	Water holding / Drainage capacity of this soil type	All medium or average (ideal)
	Colour of the soil	Dark brown to deep mustard
	What the colour of this soil tells us	High mineral & organic content No excessive water logging
	Possible Organic components of this soil	Organic matter high (some still partially decomposed) High in N, P, K & trace elements & humus
	Suitability for plants such as Vines or Deciduous Fruit Trees on a scale 1 to 10 (1 least suitable & 10 most suitable)	6-8 Could give problems with excessive vigour due to richness of the soil

Soil Sample 3	Type of Soil	Clay
<b>Paste the sample here:</b>	Texture of this soil type	Powdery & smooth
	Structure of this soil type	Plate-like to blocky
	Water holding / Drainage capacity of this soil type	Low water penetration, high water holding capacity, poor water drainage
	Colour of the soil	Red to yellow
	What the colour of this soil tells us	Water logged conditions cause oxidation reactions with especially Iron (causing the rusted stain) Relatively rich in both organic & mineral content
	Possible Organic components of this soil	Some organic matter, but lower than in loam Rich in Fe
	Suitability for plants such as Vines or Deciduous Fruit Trees on a scale 1 to 10 (1 least suitable & 10 most suitable)	4-6 Water logging can be corrected through a soil drainage system & physical & chemical soil improvement



## 5.1

SO 5 AC 1 - 2

### Instructions to Learner:

Answer the following questions:

Learner Workbook: Page 18

Facilitator Guide: Page 18 - 19

1. Name 4 different hand tools you would use during soil preparation.

**Model Answer(s):**

Hand plough, spade, garden fork, pickaxe, mat lock, rake

2. What do you understand under the word "soil preparation"?

**Model Answer(s):**

Right type of topography & soil type, Test soil, Treat soil for nutrient deficiencies and against pest & diseases, Loosen soil, Till soil, Break-up soil barriers

3. Name a typical soil preparation that will happen with hand tools

**Model Answer(s):**

Work in compost; loosen soil with spades or forks, rake soil level; remove stones by hand

4. Name a typical soil preparation that will happen with machines

**Model Answer(s):**

Rip; plough; fumigation; till

5. Give 5 advantages of effective soil preparation as well as their effects on plant roots.

**Model Answer(s):**

Improved effective soil depth  
Improved physical condition of soil  
Improved chemical make-up of soil  
No hard layers or large structures present in soil  
No large structures present in soil

6. Give 5 disadvantages of ineffective soil preparation as well as their effects on plant roots.

**Model Answer(s):**

Negatives of model answer 5



### Assessment Feedback Form

Comments / Remarks	
<b>Feedback to learner on assessment:</b>	
<b>Feedback from learner to assessor:</b>	
<b>Learner's Signature:</b>	<b>Date:</b>
<b>Assessor's Signature:</b>	<b>Date:</b>

# Perform Practical Sampling & Data Collection Duties

**B**efore the report is undertaken, the learner must be reminded of what is expected from him / her in terms of summative and reflexive competence. Read and explain to the learner, the **Preparation for Your Final Assessment** section in the learner workbook. Learners and assessor should sign off this section to acknowledge that this step was completed.

- ◆ The format is as reflected in the Assessment guide for learners. Please read it and familiarise yourself with its content.
- ◆ Use the points as described to explain to the learners what will be expected from them and to help you collect evidence for foundational and embedded knowledge as prescribed by the outcomes of the unit standards.
- ◆ Offer learners an opportunity to ask questions as per the listed criteria for the poster. Ensure that you apply the exact same methodology for each learner in order to ensure that VACS principles are adhered to.
- ◆ The benchmark for learner competence is a %\* overall test score. (\*% determined by service provider)
- ◆ This assessment tool can only be marked for learner assessment by a suitably qualified and registered assessor who is ALSO a subject matter expert in this specific field.
- ◆ If no such a person can be found to assess the learner, then it is advised that a qualified assessor consults with the appropriate subject matter expert prior to the assessment in order to establish key points for competence and/or uses model answers as supplied by a subject matter expert to allocate marks. The subject matter expert should be consulted for any answers that the assessor might have queries on. Supply learners with required stationary to design the poster
- ◆ Supply each report with the following heading:

<b>Unit Standard:</b>	<b>116206</b>	<b>NQF Level:</b>	1
<b>Learner Name:</b>			

## ■ Observation of Sampling Procedures on the farm:

Learner has to complete both activities and answer questions regarding the correct procedures to follow and consequences of incorrect methodology.

1. Explain to what kinds of sampling activities take place on your farm.

<b>Model answer:</b>
Leaf, Soil & Fruit Sampling

2. Explain why sampling is necessary

**Model answer:**

For strategic planning and decision making in order to maximise crop yield, and crop quality through fertilisation, manipulation. To determine ripeness, fertilisation requirements.

3. Explain what procedure to follow when performing soil-sampling duties

Model procedure – Soil Sampling:	Competent / NYC	Comments
<ol style="list-style-type: none"> <li>1. Clear the soil surface of debris, leaves and fertiliser. A soil sample must not be taken too soon after fertilising because this will contaminate the soil sample and lead to an incorrect analysis. The top and subsoil samples are taken by removing a core of soil from the top 0 to 300 mm and then from 300 to 600 mm soil depth, respectively.</li> <li>2. Soil samples may be conveniently taken when leaf samples are pulled. Soil sample bags are available from your laboratory agent. They should be used for submitting samples to the laboratory. Supply all the information asked for on the soil sample bags.</li> <li>3. Use a spade, trowel, soil sampling tube, auger or other tool, which can take a thin vertical slice of soil to a depth of 8 - 12 inches.</li> <li>4. Take at least 12 or 15 cores or thin slices at random over the area to be sampled. In general, one composite sample consisting of 12 - 15 cores should be taken for each block of trees. If possible, sample under the predominant variety. (For example: Stuart.) Place samples in a clean plastic bucket or other non-metal container and mix well. Fill the soil sample bag at least 3/4 full. <b>Do not use a galvanized bucket</b> if the soil is to be analyzed for zinc or other micronutrients.</li> <li>5. Cores should be pulled within the drip line, <b>not</b> between rows. The area included in one sample should have been uniformly fertilized and limed in the past. When collecting the sample, avoid high or low spots, eroded areas, and areas along roads and fences. Sample problem areas within an orchard separately.</li> </ol>		

4. Explain to him / her what procedure to follow when performing leaf sampling duties

Model procedure – Leaf Sampling:	Competent / NYC	Comments
<ol style="list-style-type: none"> <li>1. Obtain plant analysis mailing kit from the area laboratory agent's office. One mailing kit per sample is required.</li> <li>2. Sample trees between July 7th and August 7th. (Sampling can be extended into mid-August without affecting the results.)</li> <li>3. Collect 100 middle-pair of leaflets from the middle leaf of this year's growth (see illustration). Use terminal shoots exposed to the sun. Avoid twigs from the interior of the tree. Collect leaflets from all sides of the tree. Avoid leaflets damaged by insects and diseases.</li> <li>4. Abnormal trees or trees not representative of the area should be sampled and sent separately. A complete and accurate description of abnormalities should accompany such samples.</li> <li>5. Sample trees of the predominant variety in a given block. If Schley is the main variety, sample Schley; if Stuart is the main variety, then sample Stuart, etc.</li> <li>6. Immediately upon collection, wipe leaves (entire surface, both top and bottom) with a damp cellulose sponge or cheesecloth to remove dust and spray residue. Do not allow the leaves to come into contact with rubber or galvanized containers. Partially air dry and place in the large envelope of the mailing kit.</li> <li>7. Complete the questionnaire obtained in each mailing kit. Place the completed in the smaller envelope together with a check made payable to The University of Georgia to cover any charges and mail it to the Plant Analysis Laboratory.</li> <li>8. If recent soil test data were not available, it would be advisable to collect a soil sample and have it sent to the Soil Testing Laboratory.</li> </ol>		

### Assessment Feedback Form

Comments / Remarks	
<p>Feedback to learner on assessment and / or overall recommendations and action plan for competence:</p>          	
<p>Feedback from learner to assessor:</p>          	
<p><b>Assessment Judgement</b> You have been found:</p> <p><input type="radio"/> Competent</p> <p><input type="radio"/> Not yet competent in this unit standard</p>	<p>Actions to follow:</p> <p><input type="radio"/> Assessor report to ETQA</p> <p><input type="radio"/> Learner results and attendance certification issued</p>
<p><b>Learner's Signature:</b></p>  	<p><b>Date:</b></p>  
<p><b>Assessor's Signature:</b></p>  	<p><b>Date:</b></p>  
<p><b>Moderator's Signature:</b></p>  	<p><b>Date:</b></p>  