

MINISTRY OF EDUCATION
SECONDARY ENGAGEMENT PROGRAMME
SEPTEMBER 2020

GRADE: 8
Science

SUBJECT: Agricultural

WEEK 6

Lesson # 2

Topic: Cultivation of crops

Sub-Topic: The Varieties and Propagation of Citrus

Objectives

Students will:

- ❖ Correctly differentiate among the varieties of citrus.
- ❖ Discuss propagation and selection of site and rootstock without hesitation.
- ❖ Describe planting and spacing accurately.

Content

Varieties of Citrus

English Name	Botanical Name
Sweet Orange	<i>Citrus sinensis</i>
Sour/Seville Orange	<i>Citrus aurantium</i>
Mandarin/Tangerine	<i>Citrus reticulata</i>
Grapefruit/Pomelo	<i>Citrus paradise</i>
Lime	<i>Citrus aurantifolia</i>
Shaddock/Pummelo	<i>Citrus grandis</i>
Lemon	<i>Citrus limon</i>

Oranges (*Citrus sinensis*)

- ❖ Oranges are a popular citrus fruit grown along the entire Atlantic Coast of Guyana.

- ❖ The vast majority of oranges produced in the country are seeded Valencia, Pineapple, Parson Brown and Hamlin types, used for both fresh market and juice.
- ❖ Only a limited amount of seedless navel oranges are grown.



Tangerines (*Citrus reticulata*)

- ❖ Or mandarins are the second most important type of citrus grown in Guyana.
- ❖ Most of the tangerines produced in the country have seeded fruit with Dancy being a leading cultivar.
- ❖ Nearly all the tangerines produced in Guyana are sold as fresh fruit in the domestic fresh market, although small volumes are exported.



Limes (*Citrus aurantifolia* and *Citrus latifolia*)

- ❖ Are the third most important type of citrus in Guyana in terms of production volume and are the leading citrus export.
- ❖ The seeded West Indian lime (also known as Mexican lime or Key lime) is the kind most widely grown.
- ❖ Small quantities of the seedless Tahiti lime (also known as Persian lime) and the bears lime are also produced.
- ❖ Nearly all the limes are sold as fresh fruit in the domestic market, although small volumes are exported to Barbados.



Grapefruit (*Citrus paradise*)

- ❖ Is a minor citrus in Guyana and essentially all the fruit is consumed in the domestic market.
- ❖ Almost all grapefruit produced in the country have seeded fruit and consist of the cultivars White Marsh, Duncan, and Ruby.
- ❖ Market demands in many countries have shifted in preference to red-fleshed cultivars.
- ❖ There is also the cultivation of small acreages of some citrus hybrids.
- ❖ These hybrids include Ortanique and King.



Propagation of Citrus

- ❖ Citrus can be propagated by seed or vegetatively by cuttings, layers, budding or grafting.
- ❖ However, in the commercial planting of Citrus, budding is by far the most common method of propagation.
- ❖ There are two sections to the budded plant viz.: • The rootstock, which consists of the rooting system and the bottom part of the main stem or trunk, and •
- ❖ The scion or bud of the selected variety to be grown on the rootstock and developing as the entire top portion of the tree.

- ❖ In the main, Rootstocks are chosen for resistance to diseases, adaptability to soil type, quality and yield of fruit.
- ❖ Nowadays, the primary selection of rootstocks is made for resistance to Tristeza, which is considered the most destructive virus disease of citrus.
- ❖ The Tristeza-resistant rootstocks which are suitable for conditions in Guyana are Carizzo Citrange, Cleopatra Mandarin, Rangpur Lime, Rough Lemon, Swingle Citrumelo and Volkameriana Lemon.
- ❖ However, as each of the rootstocks varies regarding resistance to additional virus diseases as well as to the other factors mentioned, it is recommended that every estate should have plants on more than one type of rootstock.
- ❖ Seeds are extracted from the fruit of the selected rootstock (e.g. Rough Lemon washed to remove slime, dried at room temperature, soak for 10 minutes at 49-52°C then treated with a fungicide (e.g.) Captan) and stored moist in polythene bag at 4°C, 40°F for not too excessive a time until needed.
- ❖ The seeds are planted in prepared seedbeds or boxes and are transplanted when 4-6 inches (10- 15 cm) high into individual plastic plant bags or field beds.
- ❖ Alternatively, the seed could be planted directly into the plastic plant bags, putting 2-3 seeds per bag, thinning out and transplanting into other bags depending on the germination and growth.
- ❖ Depending on the rootstock being used, the seedlings should be ready for budding in 4 to 8 months from sowing. Budwood is selected from healthy, high yielding trees free from viruses.
- ❖ Budding is usually conducted at a height of 12 to 15 inches (30 to 37.5 cm) from ground level using the inverted “T” method.
- ❖ After successful budding, the plants should be ready for transplanting in 3 to 6 months’ time.

Video on Budding and Grafting in Citrus

<https://www.youtube.com/watch?v=iIJN-Mwd--U>

<https://www.youtube.com/watch?v=adkhSOOTjMg>

Site Selection

- ❖ Citrus can be grown in a variety of soils but irrespective of the soil type, it is essential that adequate drainage be provided.

- ❖ For under waterlogged conditions, growth is stunted, and the plants are more prone to disease infestation.
- ❖ In areas exposed to constant high winds, Windbreaks should be planted.
- ❖ Wind adversely affects the growth of Citrus, causing excessive twig dieback and premature flower drop on the windward side.
- ❖ Fruit trees such as Malacca Apple (*Eugenia* sp.) and Jamoon (*Eugenia* sp.) have successfully been used as windbreaks.
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Spacing

- ❖ As a general rule, space citrus trees using the diameter of the canopy of a fully grown tree as a guide.
- ❖ In other words, if correctly spaced, the edges of the branches of the fully-grown trees should just touch.
- ❖ The spacing therefore would vary with the soil type, terrain and other factors that affect tree growth.
- ❖ As a general guide however, the following distances between plants are suggested: Grapefruit - 6 m (20 ft.) to 7.5 m (25 ft.) • Oranges - 4.5 m (15 ft.) to 6 m (20 ft.) • Limes/Tangerines - 3.6 m (12 ft.) to 4.5 m (15 ft.)

Planting

- ❖ Planting should be conducted early in the wet season when moist soil conditions exist.
- ❖ Planting holes are dug to a size that would accommodate the plant in the bag.
- ❖ The size of the hole is therefore around 30cm (1 ft) in length, width and depth.
- ❖ The roots of bare root plants are more spread out and a - larger hole will have to be made to accommodate these plants.
- ❖ The topsoil removed in digging the hole could be mixed with rotted manure and//or some phosphate fertiliser.
- ❖ Some of the soil is then returned to the hole filling about halfway up.
- ❖ The plastic bags are carefully removed keeping the rootball intact and the plants are placed in the holes.

- ❖ The balance off the topsoil is the returned to fill the hole an thoroughly compressed.
- ❖ The plants should then be watered. After planting it is recommended to stake the plant to prevent movement by wind.



Review

Answer the following questions.

1. What are the varieties of citrus grown in Guyana?
2. Discuss the differentiating characteristics between orange and tangerine.
3. Briefly describe budding in citrus.
4. Identify the factors that must be considered in site selection for citrus cultivation.
5. Explain the spacing requirements necessary for citrus cultivation.

References

Book

1. Weever, et al (1993), Agricultural Science for Secondary Schools in Guyana, BK 2, Ministry of Education National Center for Educational Resource Development, Georgetown, Guyana. Chapter 2, pages 55-61.

Internet Sources

<http://agriculture.gov.gy/wp-content/uploads/2016/01/citrus.pdf>

<https://www.youtube.com/watch?v=iIJN-Mwd--U>

<https://www.youtube.com/watch?v=adkhSOOTjMg>