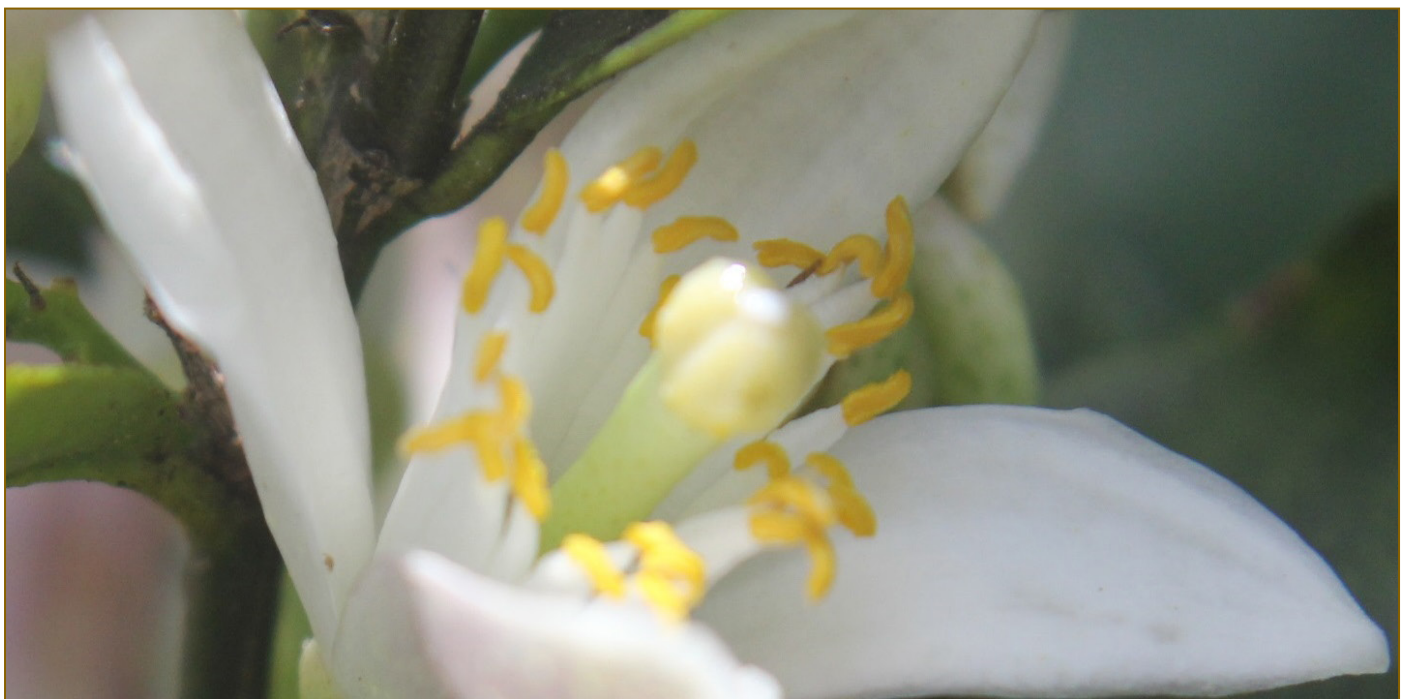
LESSON 1 INTRODUCTION: SCOPE, NATURE, BOTANY AND TAXONOMY

The citrus genus varies widely in respect to the variety of species and fruit types within it - making this group of plants quite exceptional. The distinctive glossy green foliage and attractive fragrances of leaves, fruit and flowers add to the charm and make citrus highly sought after and widely grown by both commercial producers and enthusiasts.

CITRUS TODAY

Citrus fruits are significant in terms of global trade because they are the highest value fruit. In this market they are sold as whole fruits or as juice. The volume of world production has steadily increased over recent decades and oranges account for more than half of all citrus production. More than half of the world's production comes from the Northern Hemisphere and, in particular, from the Mediterranean and United States. In the Southern Hemisphere, Brazil is a key producer and the world's largest exporter of oranges.

Besides their significance in global trade, citrus trees are versatile and useful trees for the home garden. As well as bearing desirable fruit they have attractive blossoms and foliage, and they exude a wonderful fragrance. Although they are often viewed as plants which do best in Mediterranean and subtropical regions, they can be successfully grown in many climatic zones if provided with suitable conditions. They can be grown in most areas where there is no risk of constant heavy or severe frost. In these regions, they are best grown in greenhouses or as conservatory plants.



Citrus flowers have four petals

Suggested Tasks: ▼

Throughout this course you will be provided with suggested tasks and reading to aid with your understanding. These will appear in the right hand column.

Remember: these tasks are optional. The more you complete, the more you will learn, but in order to complete the course in 20 hours you will need to manage your time well. We suggest you spend about 10 minutes on each task you attempt, and no more than 20 minutes.

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Harvesting

Autumn is a great time for many types of citrus fruit because they ripen at this time of year. In fact, if varieties are chosen carefully it is possible to extend the harvest of these fruits throughout much of the year because some mature in spring, others in autumn and some in winter.

Increases in world production represent a growing sentiment towards healthy food products along with increased global affluence. For the home gardener, there can be few greater accomplishments than eating fruit straight from the tree, or using fruits to make marmalade, freshly squeezed fruit juice or refreshing lemonade.

A Brief History

Citrus are thought to have been cultivated in the ancient world (Egypt, Greece and Mesopotamia) as early as 4,000 BC. The “citron”, a less juicy type of lemon, is referenced in the Bible in the Old Testament. It would seem that citrus was introduced to the Mediterranean and northern Africa through Arab trade about 1,000 BC. It is likely that the Roman Empire helped it spread throughout Europe.

It is known that citrus plants were grown in Spain by the end of the Middle Ages. Christopher Columbus is said to have introduced limes to the West Indies from Spain in 1493. Spanish explorers also introduced them to other parts of the Americas. Today, the United States, Mexico and Brazil account for almost a third of total world trade in citrus. The global market for citrus only really opened up in the nineteenth century and remarkably orange juice only became established just before World War Two.

BOTANY OF CITRUS

The citrus genus includes about a dozen or so species mostly of tropical and subtropical origin. All citrus belong to the Rutaceae family.

Family: Rutaceae

Genus: Citrus

A wide range of common names are used for different species and citrus hybrids including lemon, lime, orange, grapefruit, mandarin, tangerine, cumquat and calamondin.

Appearance

They are mainly small to medium evergreen, sometimes spiny, trees. The leaves are thick, leathery and usually glossy making them attractive in their own right. The leaves and skin of the fruit usually contain numerous oil glands.

Flowers are typically white, occasionally purple, and often very fragrant. They are borne in axillary clusters and are either solitary or appear in pairs. The aromatic, leathery skinned fruits have fleshy and often very edible pulp.

Reproduction and Variability

Citrus classification is not straightforward from a botanical perspective. Many varied types of citrus have emerged because hybridisation, sports and apomixis occur readily in this genus. Hybridisation is where two different species interbreed. Sports are spontaneous mutations in plants which cause parts or whole plants to form

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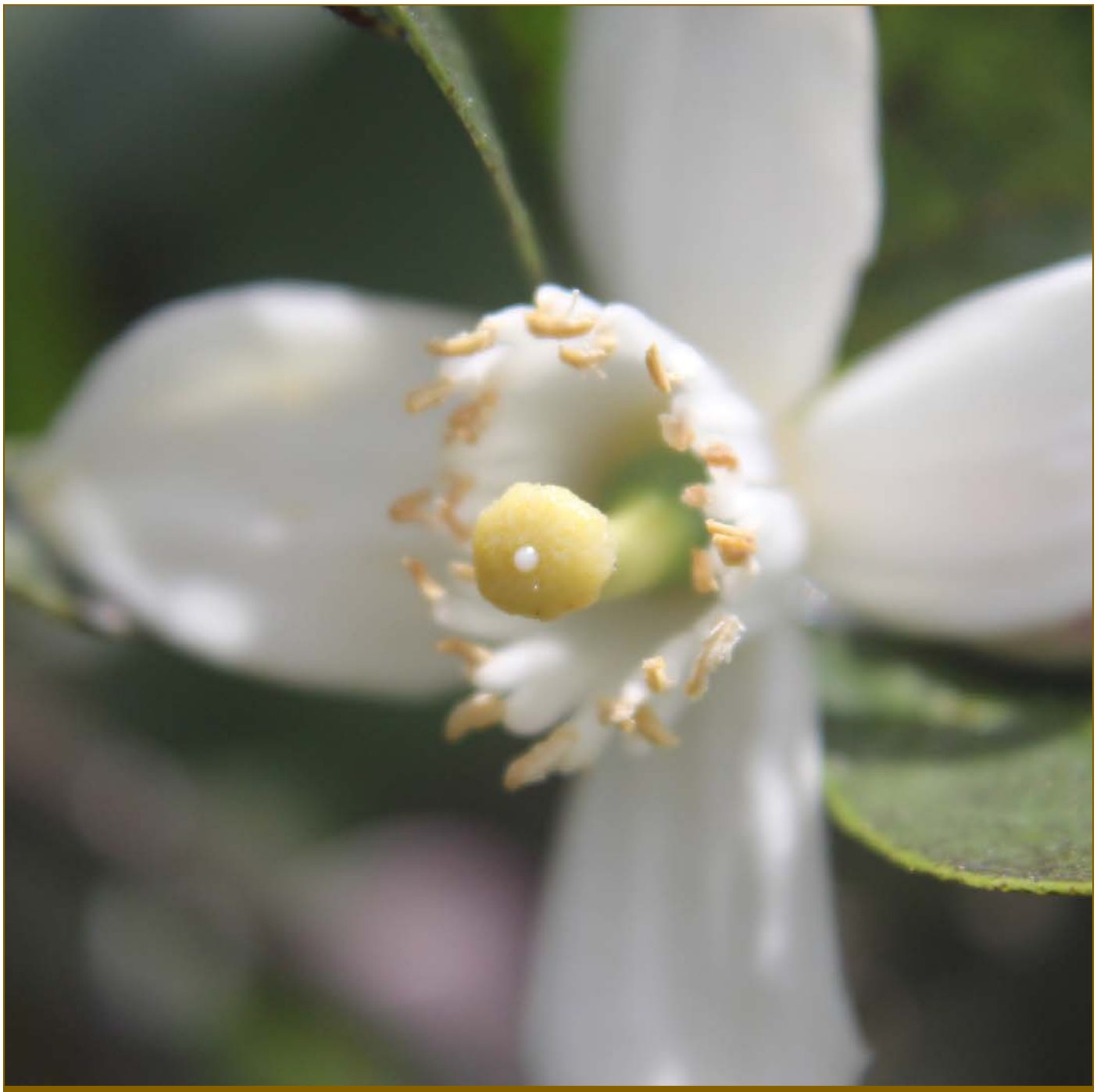
Suggested Tasks

Discuss different citrus fruits, their uses, and popularity, with someone who likes eating citrus (e.g. friend, family, colleague).

Now, write a list of the 4 citrus fruits you think are produced in the largest tonnages per year around the world. Rank these from 1 to 4 where rank 1 is the highest.

Now search online for “world production tonnages citrus fruits” and see if you got it right.

different morphological characteristics. Apomixis is asexual production of fertile seed in a single plant i.e. the embryo arises form only the female gamete by nucellar embryony. Whilst this means that seedlings produced in this way are identical to the parent, there is often more than one seed embryo within the citrus seed, a phenomenon known as polyembryony. Sometimes these additional embryos are produced sexually and they can therefore be variable. Given that most citrus are reproduced by grafting and it takes between 4 and 7 years for trees to reach fruiting size, it can cause difficulties in creating uniform seedlings i.e. selecting rootstocks from nucellar seedlings to graft on to. More specific research into the genes responsible for these reproductive variations may help to control variability in future.



Citrus flower

Flowering and Pollination

Flower buds begin to initiate early in winter and continue to develop until flowering in spring. All citrus trees flower in spring, apart from Cumquats, which flower in summer, with lemons also flowering through summer and autumn. Depending on the conditions throughout the season, flowering may continue for up to six weeks.

Fruit crops begin to ripen after flowering, this happens throughout late autumn to early spring, depending on the growing area and variety of citrus. An example of this would be ‘Navel’ oranges, which ripen late autumn to early winter, whereas ‘Valencia’ oranges will ripen in spring through to autumn. The ‘Valencia’ crop and lemons will begin flowering whilst still bearing fruit. This does not appear to have any adverse effect on the trees, provided they receive adequate nutrition and water.

Flowers on most varieties of citrus trees are self-fertile and therefore do not require cross-pollination, which means it is generally only necessary to have one tree of any variety to get a crop each season. A number of citrus trees, however do require cross-pollination in order to produce enough fruit each season.

Cross pollination occurs freely for ‘Ellendale Tangor’ and the early ‘Imperial’ mandarin. The ‘Valencia’ orange is known to be a beneficial pollinator for many mandarin varieties. The advantage of cross-pollination is that some mandarin varieties fruit set and fruit size are increased. A disadvantage which occurs with improved cross-pollination is that the fruit will have a higher number of seeds than fruit which has not been cross-pollinated.

Fruit Development

Large healthy citrus trees drop at least one third of their blossom buds, this is due to their incapability to physically hold all of the fruit they would produce. Of the remaining buds only one to four percent will set fruit which reaches maturity.

Young trees often produce blossoms within one to three years of planting, some of which will set fruit. Most young trees should have their fruit removed so that they will not inhibit the continued development of the tree. From the third year onwards leaving some fruit to mature on the tree can be beneficial. Some citrus trees can take ten to twelve years to reach its full cropping potential.

Fruit shedding occurs in two stages, the initial shedding happens during the flowering period, where flower buds and tiny fruitlets fall from the tree. The second fruit shedding period occurs when the fruitlets are about the size of a pea. After this process the trees will still have a number of small, shiny green fruitlets among the leaves.

Abnormal fruit shedding can occur due to a number of factors, which include:

- Excessively wet soil - causing root rot.
- Lack of soil moisture - moisture stress.
- White oil sprays for scale control – may burn tissues.
- Imbalance in nutrients - physiological shedding in late spring to early summer.

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Suggested Tasks

Go online and search for the phrase:

“citrus fruit shedding video”.

Watch a couple of short videos to learn more about reasons why citrus shed fruit and methods growers have used to reduce fruit loss.