



Care of Containerized Citrus Trees

The objectives of this activity are:

- ✿ To help develop citrus growing skills
- ✿ To understand the importance of record keeping
- ✿ To have an increased awareness of the Central Florida citrus industry
- ✿ To become aware of the career opportunities in the citrus industry
- ✿ To encourage an enthusiastic interest in citrus production
- ✿ To develop an understanding about the safe use of pesticides
- ✿ To understand the relationship between citrus production and the environment and natural resources of Florida

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Soil / Potting Media Selection

There are two important first steps in planting any new plant in a container – choose a good, healthy plant and a good, appropriate soil. You are halfway there with your tree, but now you need soil! In container growing though, we mostly call the soil - media. You will find it is called other things too such as: substrate, potting media, potting mix, potting soil, growing media, and sometimes still just “soil”. These names pretty much all mean the same thing and any term can be used.

These types of soils are engineered, or created by humans, with natural materials or components of all different types, specifically for growing plants in containers. There are many components that can be used to make a potting media and the amounts of each component can be adjusted to best suit certain types of plants. Citrus trees planted in the ground in a grove prefer sandy, well drained soils. While sand or sandy soil dug up from the ground and put in a container might seem like a logical option, it would be heavy to move around and would require a lot of watering and fertilizer applications to stay healthy. It could work, but it is not the best choice. **Citrus trees need a potting mix that is well drained so the roots have enough air to breathe but that can also hold enough water and nutrients so that both need to be applied less often.** You can buy potting media that is already mixed for you. These are sold in retail stores and nurseries. Not all potting soils are the same though!



Most of them contain a component called peat. Peat is natural soil-like material that forms slowly over time from decaying plant material in wet areas. It must be harvested and processed to make it into a component in potting media and there are different levels of quality. Peat that is formed and harvested in Florida is good for certain uses. The less expensive versions of potting media are usually made with peat from Florida and wood products. The more expensive potting soils usually contain a type of peat called sphagnum peat. This peat is higher quality and much of it comes from Canada and other countries in Europe. Another good material like peat, is shredded coconut fibers called coconut coir. Perlite is another common material in potting mixes and is the little white ‘beads’ you can see clearly against the rest of the media. Perlite is used to allow potting soil to drain water well so that it doesn’t hold too much and allows plant roots to have enough air. This is an important thing since citrus roots need good drainage for their roots. Pine bark and other wood products are also used in potting soils for this purpose. Pine barks come in lots of different sizes and smaller sizes (less than 1”) are better for smaller containers (the size container you will be putting your tree in is still considered a small container). Potting mixes will also have dolomite in them which is a product that is used to make the soil less acidic and they may also have a slow release fertilizer incorporated in them. If you buy a prepared mix, be sure to get one that is well drained and has a pH between 5.5 to 7.0 (5.8 to 6.5 is best). You can also choose one that has a starter fertilizer in it already or you can add your fertilizer during transplanting, or after. See the fertilizer section later in this document for more information.

You may also want to experiment and make your own mix using some of the components mentioned above and/or others you can learn about on your own. There are many possible combinations of materials that can be used. Have fun with it! Just remember, you will want to have your mix well drained with proper pH (mentioned above). There is no one perfect mix, but rather countless options!

Here is one example:

4 parts sphagnum peat	+ 5 parts pine bark	+ 1 part perlite {+ 3 tablespoons of dolomite}
(40%)	(50%)	(10%)
(8 quarts)	(10 quarts)	(2 quarts) = 20 quarts = 5 gallons

**Note: the dolomite amount above is based on 5 gallons of this mix. Five gallons should be enough to fill one given container.*



Transplanting

Now it's time for the real work of transplanting your tree!

Transplanting is just moving something from one location to the other and in your Citrus Tree Project, moving your tree from its small container into the 5-gallon pot provided is an important step. This larger container and new media will be its home for the next year and it is important to be sure you perform this task correctly. *Also, be sure to keep your tree in this container until the contest – do not move it into a larger one.*



Once your media is ready, you can proceed with the transplanting of the tree. **Be aware of thorns that may be on your tree so you don't get poked when handling it.** You can even trim them off first if you need to. There are a couple key terms and points to know about transplanting before jumping in. The root ball is the part of the plant in the container – the potting soil and the roots. The top of that root ball we call the “soil line”. In any container, you want the finished soil line about 1” from the top or lip of the container so you have space to add water and nutrients without either spilling over the side. The main goal of transplanting is to keep the old soil line of the smaller container even with the new soil line you make in the bigger container. Or said differently, planted at the same depth in the new pot as it was in the pot it came in! It can even be slightly higher, but avoid planting it deeper. So, start by putting a little media into the new container (about 1/3 of the volume) and make a little hole in the center of the pot where you will place the tree. There should be at least an inch or so of media at the bottom of your hole the root ball will sit on. Next, take the tree out of the container it is in by gently pressing the sides of it to loosen it from the container. You can pull it straight out by the trunk. Set it in the hole to see if it will fit. If the top of the root ball or soil line is higher than an inch below the top of the container, you will need to trim the bottom of the root ball off accordingly. Use a pair of pruners and cut right through the root ball. This will not hurt the tree. If there are a lot of roots packed in closely together or any wrapping or circling around the root ball, loosen them gently with your hands so they aren't circling. If you want to add fertilizer, now would be the time to mix some into the soil in the container, because from here you are just adding media around the roots and up to the soil line. Pack the media in with your hands pretty firmly to get out any large air gaps. Media will tend to settle and compact some anyways on its own so packing it with your hands avoids having to come back later and add more soil because they roots are exposed. Remember too that one of the main functions of soil is to be an anchor for plants, so if the soil isn't packed in well around the tree it will lean because its roots are not big enough to hold it upright yet.

After this, water the media in very well – slowly and soak it a few times so that water runs out of them bottom holes. You want to make sure ALL of the media gets wet. It is best to avoid watering it again until the top 2-3 inches are dry to the touch. It will get lighter in color and the pot should feel a lot lighter if you lift a side of it. This should take about a week or so but will depend on how sunny your location is and what media you chose. It would also be a good idea to stake your tree. You can use a piece of bamboo and stick it down in the container against the original root ball and use garden tape to loosely tie the trunk to the bamboo in several locations.

Irrigation



Probably the most important item your tree needs to grow quickly is **water**. Of course, you will need to feed the tree with a balanced fertilizer and may also have to treat it for pests. Some research has shown that water is the most important item for obtaining maximum growth. The planting medium you have used will influence how much water to apply and how often you will need to irrigate. **Avoid over watering** which causes waterlogging. Forty-eight hours of water logging can severely damage the root system. Many people make this mistake, especially with new plants after transplanting! **Do not let the potting media dry out completely** either, as it is difficult to re-wet thoroughly if so. In this case, apply water very slowly, almost at a drip, to re-wet the media. Do not apply the water at a rate which it flows over the surface, down the sides, and out the drain opening faster than it soaks in. Apply enough water so the excess flows out of the drain openings at the bottom. However, excessive use of water will "leach" fertilizer from the soil. So, this is a balance. Research has shown that about 15-20% of the water applied should leach out of the bottom of the container at each watering.

Irrigating twice a week should provide enough moisture to prevent wilt. During the cooler months once a week will be adequate, during the hottest months three times a week or more will be required. The best way to determine the moisture of your soil medium is the "**two finger moisture meter**" where you simply insert your fingers into the medium pinching the soil to determine the moisture present. Larger trees require more water, so as your tree grows the need for more water increases. If you see the tree is wilting, you have waited too long to water your tree. You will need to experiment with your tree to see how much water the medium can hold. Slowly add water and wait a few minutes to see if any drips out of the bottom, noting how much water was applied. Repeat this process two or three days later, the amount needed the second time should be given to the tree every two or three days (depending on how long you waited). You may want to carry out this test several times during the year to see if the tree needs more water.

Fertilizers contain salts and over time these salts can accumulate in soil and injure plant roots. This can especially happen when high rates of fertilizer are used and lower amounts of water because the salts do not get leached enough from the soil in such cases. Also, too little water will reduce growth.



Even though it is better not to over irrigate citrus trees that are growing in the field, those grown in containers probably will do better if they receive a little too much water! Water management is critical for maximum growth of your tree.

Fertilizer



Fertilizer can be defined as any form of a plant nutrient or nutrients applied to the soil or plant to help the plant grow. It is important to remember though that fertilizer is not plant food as plants make their own food from the sun! They do however need certain **nutrients** to do this – 17 of them to be exact! From the same root word we get the word ‘nutrient’ from we get the word ‘nutrition’ and plants and crops need proper nutrition too, just like people. Fertilizers to a plant would sort of be like taking supplements or vitamins for people. These nutrients plants need are actually elements – the same elements you can see on the periodic table you may have learned about. Out in a nature, plants don’t get ‘fertilizer’ because they get the nutrients they need naturally from the ecosystem they live in. But growing plants in containers is a different story. So, fertilizers are used to provide these nutrients or elements to them and applied correctly, can help them grow fast and be healthy, productive plants.

That said, plant nutrition can be simple or get pretty complicated - and it usually gets pretty complicated! To try to keep it simple, let's know that 14 of the 17 essential nutrients plants need to survive come from the soil, or applied to the plant leaves as a foliar fertilizer spray. Of these 14, 6 are called macro nutrients and needed in higher amounts and 8 are called minor nutrients and needed in smaller amounts. You may see or hear them referred to as macros or minors. When selecting a fertilizer, look for one that is complete, meaning that it has a balanced amount of all or almost all 14 of these nutrients. Better yet, you can probably find a fertilizer that is made especially for fruit trees or maybe even specific to citrus. Fertilizers come in many different forms: regular granular (quick release), slow release, controlled release, liquid, foliar sprays, and more. Often growers use a type of slow or controlled release fertilizer in the potting media and supplement additional nutrition as needed with liquid fertilizer applied to the soil or directly to the leaves as a foliar spray. Like many things there are a variety of ways to accomplish the goal. Whatever you choose, follow the label instructions on each product closely. The label will give specific directions and is the best source for instructions for knowing how much and how often to apply that particular product.

In the *Transplanting* section of this document it was discussed that fertilizer could be added at the time of transplanting or you could wait to apply later. If you choose to add fertilizer to the soil when transplanting, be sure it is slow release or controlled release forms – the label will say. Slow and controlled release fertilizers are designed to not “release” all the fertilizer within the pellets at one time but rather over a longer period so they have access to it longer and so it does not hurt their roots by having too much of it at one time. Young plant roots are more sensitive to too much fertilizer so you don’t want too much of it around at one time during this stage.

If the plant is lacking in any one nutrient, it will begin to show deficiency symptoms. Some nutrient deficiency symptoms can look similar to others but to the trained eye, you can often identify which nutrient is deficient by observing specific deficiency symptoms! This is difficult to any new (and sometimes experienced!) grower but there are several resources available to help with this.



Integrated Pest Management (IPM)

A wide variety of pests will attack all parts of a citrus tree. Some pests cause only minor damage, and in many cases, there is no reason to try and control them. Other pests cause cosmetic damage that will prevent the fruit from being sold in the fresh fruit marketplace, and these pests need to be controlled. There are a few pests and diseases that can seriously damage or even kill a citrus tree, and these are major problems that need to be controlled. There are several methods that can be used to control diseases and pests of citrus. You can elect to treat the problem with one or more chemicals called "pesticides". There are many pesticides that are labeled for use on citrus. This means the government has approved the application of the pesticide on citrus. To obtain the "label", the manufacturers of the pesticide must spend millions of dollars for all the required testing. All the money and time invested provides growers with the assurance that if the pesticide is used correctly, they will control the pest without hurting the person applying the chemical or damaging the environment. But pesticides always come with a cost as you will learn. **Always be Careful When Using any Pesticide!**



While pesticides can be safe and effective, improper use or overuse can have harmful effects on people, plants and the rest of the environment. They can also be very expensive to use. Growers therefore use an approach to managing pests called "Integrated Pest Management" or IPM. This means they try multiple methods of reducing pests, starting with methods that have the least negative impacts on the surrounding environment and move on to ones that *could* potentially impact the surrounding environment more so, only when needed. Some of the strategies used in IPM are the use biological controls, rotating crops, cultural practices, and using 'softer' pesticides that don't kill the good insects first before moving on to more toxic pesticide options.

An exciting, more natural way to control pests is by implementing biological controls. In nature there are lots of insects and diseases that attack the 'bad' pests too. Biological controls are naturally occurring insects, diseases or organisms that kill or neutralize pests that damage or kill desirable plants. They are a great way to control pests because they do not have harsh side effects to the plant, people or environment around them, can be less expensive, and can work more effectively. Unfortunately, not all pests in Florida have biological control agents. Scientists continue to look for these agents. In some cases, the biological control agents are produced in a laboratory and then released into the grove to attack a specific pest.

The first step in IPM is the identification of the target pest(s). Once you know what the pest problems are, then you can determine the best method of control. Understanding the principals of IPM is important because if we cannot manage pesticides properly, this valuable tool may be removed. Using organic and/or more natural products like oils, soaps, copper and sulfur products to control pests would be part of an IPM approach and these kinds of products would be a good choice for you to use for this project. Use of tools like netting over individual plants or groups of plants that keep out insects would be an example of a mechanical control method that could be used in an IPM program.

Pest Identification

Diseases



Citrus Greening or HLB – blotchy mottling of leaves, tree stunting, discolored and misshapen fruit, twig dieback, fruit drop, overall tree decline.

Melanose - Small, raised, brown bumps that feel like fine sandpaper on fruit, leaves and twigs.

Scab - Causes large, raised lesions on fruit and leaves, only attacks certain varieties, grapefruit is one.

Greasy Spot - Looks like a greasy spot which shows through on both sides of the leaf. Causes leaf drop. Early damage is a light brown spot on the bottom side of the leaf.

Sooty Mold - A black film on the leaf surface which develops on the honey dew excreted by aphids and whiteflies.

Foot rot - A disease of the trunk and roots where the bark cracks, dies, and exudes a gum like sap.

Insects and Mites

Asian Citrus Psyllid – the insect that is responsible for transmitting HLB, a devastating disease to citrus in Florida. Flying insect smaller than a finger nail and brownish in color with red eyes. Sits at an angle on the plant when it is resting.

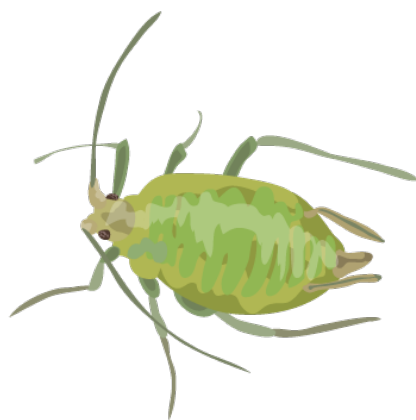
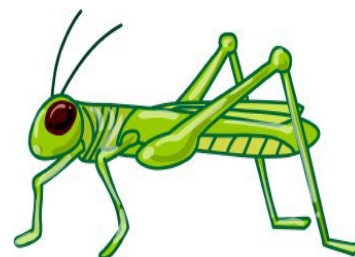
Whiteflies - Small white flies about the size of a gnat which excrete honey dew.

Aphids – small, usually green or yellow but can sometimes be darker colors. They reproduce quickly and often seen in large numbers feeding on new growth. Cause leaf curling and distortion.

Grasshoppers- Several types that will eat large chunks from the leaves.

Rust Mite – arachnid (not an insect) that causes a smooth dark brown to black color on leaves and fruit. Can make growing for fresh fruit difficult.

Citrus Red Mite -A red to purple spider mite which causes stippling type damage and often found on mature leaves.



Scales - Several species found on citrus. Snow is white and likes trunk and limbs. Red is round and found on fruit and leaves (size of pin head). Purple also likes fruit and leaves; it is shaped like oyster shell and same size as red scale. Black scale likes the stem of fruit but can be found on all twigs, has an “H” shaped back and babies are soft and light brown in color.



Pesticide Safety

Before using any pesticide **read the label on the container**. The label will tell you how to use the pesticide and what precautions to be aware of when using the pesticide. Pesticides can be absorbed into the body through the skin (hands and feet especially), inhaled into the lungs when you breathe the vapors, or by mouth by not washing hands before eating following pesticide use. The following are some commonsense rules in using pesticides.

1. Have your parents or guardian present when you spray.
2. Wear clothing that covers your arms and legs. Wear rubber or plastic gloves and shoes to protect hands and feet. If you accidentally spill a pesticide on your clothes, immediately change clothes and wash the area of your body contacted by the pesticide. Wash contaminated clothing separately.
3. Mix pesticides according to directions. Do not look inside the sprayer while you are mixing a pesticide. Stand off to the side so the pesticide does not splash in your face.
4. Do not spray when it is windy. If you spray during a gentle breeze, make sure the spray drift blows away from you.
5. Spray pesticides in a well-ventilated area. If you start feeling dizzy or nauseous when applying a pesticide, stop spraying and move to an area of fresh air until symptoms pass.
6. If you mix more pesticide than you can use, dispose of the excess by spraying on labeled plants or turf. Do not leave pesticides in the sprayer. Do not dispose of excess pesticides in the sink.
7. Once you have finished spraying, rinse the sprayer 3 times.
8. Do not mix or store pesticides in areas where food is prepared.
9. Always store pesticides where children cannot get into them. Never transfer a pesticide from its original container into another.
10. If a person is accidentally poisoned by pesticides, take them to a doctor immediately. Take the pesticide label with you to the doctor and check the label for first aid information as to what you can do before the person reaches the hospital.

*Always read and follow the
label instructions.*

The label is the law!



Gloves



Glasses



Closed-Toe
Shoes



Pruning

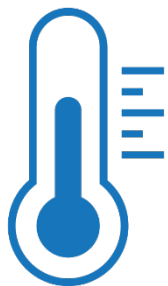


Heading back and thinning are two types of pruning. Cutting back or heading back is simply cutting off the end of a twig or branch. This encourages lateral buds to develop, thus making a dense, heavily sprouted limb. Thinning on the other hand discourages lateral development because the entire branch is removed at its origin. Some new growth will develop, but this will not nearly equal the growth associated with heading back. Remove dead wood and weak growth as necessary using the thinning technique. When cutting weak and dead wood, cut into living wood as close to the branch or twig as possible to eliminate any stubs.

Removal of the shoot tip will encourage branching, which is necessary to form a well-shaped and dense canopy. This technique can be used most effectively when the new shoots are 4 to 6 inches long. All pruning which encourages branching should cease in late January or early February unless the tree can be easily protected from cold weather. Always figure on six weeks for the new growth to develop. Also prune or shape to maintain a symmetrical appearance. Long and leggy growth should be cut back to discourage uneven or lopsided growth.

In some cases, certain branches can be trained in a desired direction by staking or tying. This is a good substitute for pruning when the tree has adequate foliage, and no need exists for encouraging more branching. All growth that takes place below the main scaffold limbs should be removed. Certainly, any root spouts that may develop need to be removed as soon as they are discovered. The trunk should be straight and free from any growth below the bottom limbs that were established in the nursery. There is no need to paint pruning cuts, they will heal quickly. It is best to prune small limbs and not wait until they reach ½ inch or more. A well pruned tree takes an eye for symmetry; the tree needs to look the same from all angles.

Cold Protection



Citrus trees must be protected from frosts and freezes to prevent damage to the foliage, twigs, and the trunk. The simplest practice is to place the tree in a protected area such as a porch, carport, or garage. Do not leave the tree in a shady area for extended periods of time for this will produce "leggy" rather than compact growth. The next best approach is to place stakes, 3 or 4, around the pot and enclose with a tarp or blanket. If you choose clear plastic be sure the tree does not touch the material. You do not have to cover the top of the tree. If the tree is to be left outside during the winter and it is enclosed in its "house", it will be necessary to have a heat source available during those nights the temperature is expected to reach the thirties. You can use a light bulb or a small amount of water that flows continually, at least 10 gallons per hour will be fine, as a heat source. Those trees that are left out in their "house" will continue to grow because they will be warm during the day as well. In addition to cold, winds (especially cold dry winds) can cause severe and possibly total leaf drop. Protecting the tree from windy conditions is the only means of avoiding this condition. Your citrus tree should be protected from the wind all year long. It may be best to build a "house" for the tree, you may need to take it inside on cold nights, but most of the time it will do well in the warm sun.

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