



# Limette

## Citrus Potting Mixtures

Usually Citrus is grown commercially surround the globe, were climatic environment permits.

In hard clay or loamy soils usually Citrus aurantium, the SourOrange is used as rootstock, and in mediterranean climatic habitats the trifoliolate orange is chosen!

Primary choice for the rootstock is the soil texture and soil condition, followed by climatic and disease factors to be considered.

For citrus in containers, the planting material, often named compost, dirt or planting/potting mixture is exchangeable. So the citrus container gardener can mix it's own potting media, well fitting the demand of citrus trees.

## Purposes of Potting mixtures

Most citrus trees can be successful grown in dense loamy soils up to light sandy soils. Usually here the grower choses a rootstock, which grows in the soil beneficial. The container gardener does often not know, which rootstock his plant has, thus is unable to be sure, if the potting media in the pot is beneficial for his plant. Often heavy loam mixtures can be found, which harden in sun, and make the pot to a cement like mass around the roots. In most container gardening climatic such a heavy potting media will ensure only one thing: Root problems

Even some very like potting medias which surround the roots of citrus trees at the local plant sellers may fit only nursery or regional growing conditions, but may lead in most container gardening environment to hard irrigation and fertilization practices.

So the main purpose of a good potting media for citrus trees is to keep water, without establishing waterlogging conditions, aeration of the roots must be ensured. The potting media should not be light

and should not be heavy, not to coarse not to fine. The rooting media should have a possibility to buffer some pH influencing salts in irrigation water, as it should not to quickly degenerate to a fine texture, like most peat moss flower potting mixtures do.

Citrus trees develop not a real fine root mass, they have strong roots, which also can penetrate a more coarse potting mix and ensure a good and strong hold of the plant.

So the main purpose

of the potting mixture is to give the plant a safe hold and ensure a good water and air support to the roots, as keep nutrient elements in solution for the roots.

## Potting mixture elements

**Peat moss** is the most used basic element in potting medias. It can hold twice to four times more water than dry weight. A disadvantage is the quick decomposing of the peat moss to a fine dust like stuff, which will lead to waterlogging conditions and a very bad root zone aeration. Also dry peat moss will only badly take up water again, so a special peat moss processing is need, to prevent this water avoiding effect.

**Leaf litter compost** is a non standard element in potting mixtures, but has the beneficial effect to hold water, have a texture to provide also some root aeration as to provide some nutrient elements, as usually most composts do. It will decompose much slower then peat moss to a fine texture.

**Cocos fiber** is even a newer material. Cheap cocos fibers are often rinsed in salt water, and give high salinity levels to a potting mixture, which is a disadvantage and can lead to root problems. But high quality cocos fiber potting mixture elements do not quickly decompose, remain in their ability to hold water and provide a very good root aeration. Cocos fiber is very low in nutrient levels, thus work without fertilization very bad a primary potting media.

**Wood fibers** is a new developed material. Wood pieces are processed to fine pieces with a coarse surface. They provide good water holding capacity and keep a long time their structure, so decompose very slowly. Because of their texture, most wood fiber elements can only give water so fine roots, coarse roots maybe unable to penetrate the fine wood fiber pores to take out the water and nutrients. Wood fiber decompose very slowly, but for this process nitrogen is need, so high wood fiber proportions may lead to low nitrogen levels available for the plant.

**Sand** is one of the most used dressings for potting mixtures. Sand is infertile and does not provide any nutrients to the plant, except calcium and magnesium, if some lime can be found in the sand particles. Sand will only provide low water holding capacities, because the sand particles do not ensure any porous structure or ensure high porous levels between the particles. Only fine sand can hold water well, but often the porous volume may make the water unavailable for citrus roots, because of being to fine. Also fine sand is a bad aerated environment, thus can lead to root damage. But sand in not to fine particles will ensure usually a very good root aeration, an will provide this effect also if mixed to other potting materials. So sand primary will raise the effect of drainage and root aeration, which is very beneficial for any citrus potting mixture.

**Loam and clay** have a very high water holding capacity by very low levels of aeration. Thus can be used, but must strongly buffers with good drainage materials, to ensure rooting zone aeration and

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Differend Organic and Anorganic matters for composing a sufficient potting mixtrue for container grown citrus plants

drainage. Clay and Loam provide usually some nutrients to the plant, especially trace elements, but of their often compact density cannot be penetrated by the fine citrus roots, so be unavailable for the trees.

**Pine bark compost / grinded bark pieces** are also a new material. Bark pieces, especially from conifere trees are sold as mulch material, to prevent soils from high water evaporation in summer. A beneficial effect the container gardener can use, but mixed to the potting mixture, the decomposing of the bark pieces will take away high levels of nitrogen, so should be avoid. Much better is pre-composted bark in various piece sizes, often sold as orchid bark compost or bark grind. Those have the same effect as wood fiber, and increase root zone aeration and drainage.

Bark grind has also an adequate water holding capacity, but as for wood fiber, maybe unavailable because of to fine porous texture.

**Lava** is a porous volcanic stone. Melted minerals will due volcanic activity blown up by volcanic gasses to a foam like material, if cooled down, it will solidify to a high porous stone structure we call lava. Those usually basalt material is high in mineral contents, which loose very slowly in composts by natural decomposing effects. The most beneficial effect of lava, especially if the pieces are not to large is the water holding capacity in large pores and the high root zone aeration. Also the provide weight to the compost and give the roots a very good hold.

## Potting mixtures

As we knew now the purposes of potting mixtures and the benefits of the potting mixture elements, we can discuss the potting mixtures.

In literature usually following basic dressings can be found for citrus nursery container culture:

### For citranges

6 parts of composted bark  
3 parts of coarse sand  
1 part of blond peat moss

### For sour-orange

5 parts of composted leaf liter  
2 parts of sandy loam  
1 part of coarse sand  
1 part of blond peat moss

### For Citrus macrophylla and Citrus volkameriana

4 parts of blond peat moss  
2 parts of coconut fiber  
2 parts of black peat moss  
2 parts of zeolite

Usually those mixtures seldom can be mixed by a container gardener, but in general and as orientation we can use those recipes as basics for our own mixtures.

So the trifoliata orange need a acid soil, so we use recipe one and add some leaf liter to get a very good substratum. So most special potting mixtures our dealer sells for citrus, is made on this recipe. The low root zone aeration can in winter be a problem, if our trees are not grafted on trifoliata orange. So that's the backdraw of this rich, and high water holding potting mixture.

We may add sand, to ensure better fit for other rootstocks, but cannot provide ideal environment for other rootstocks.

As we can see, the recipe two is even very dense and heavy. If someone has to lift the pot and carry it, it will be the highest backdraw, and for other rootstocks, the substratum may be not acid in reaction enough, and high organic content may also be problematic.

Last recipe is to high in peat moss, will to quickly decompose and lead to root problems, so another potting mixture is need.

So we start with coconut fiber of high quality and low salinity levels. For a basic mixture we take coarse sand and coconut fiber in equal parts and mix well. We add now fine lava pieces or Seramis (Seramis is a non-natural high porous clay granulum). In equal pieces if a higher drainage is in demand, or two parts of the basic mixture and one part of the lava for demands with lower drainage.

For trees which require more acid soil reactions, we can add two parts of the basic mixture one part bark grind. Organic parts can be added by adding composted leaf liter.

### So coconut fiber, lava (Seramis) and Sand provide a very good all purpose basic dressing for the citrus container gardener.

And for personal demands, we can add bark grind and composted leaf liter. So any container gardener can make his own recipe, and will find beneficial mixtures for his purposes and culture.

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A very well made mixture made of fresh coconut fibers, leaf compost, lava grind and sand. It's very good aerated, highly draining and ensures best growing conditions

## Sold special mixtures

Usually new citrus owners will buy a plant, a care instruction, a fertilizer and usually a special potting mixture bag.

Most of these mixtures are some dressed container potting mixtures, and somewhat sold more expensive. Some substances, like root stimulators and special water storing particles are seldom really needed.

Usually those peat moss mixtures hold enough water, so a special water holding effect is not needfull. A root stimulator is often also not needed, because if the substratum ensures good root zone aeration and drainage, it will be beneficial for root growth and root development, if temperatures in root zone permits. To high water levels may avoid a good root zone temperature, thus prevent good root development. Thus a more coarse structure of the soil will even ensure good root zone temperatures, because a good aerated soil

heats up much better, than heavy or very wet potting mix.

so those sold potting mixtures should be blended with sand and/or lava, just to ensure a good root aeration and buffer the effects of the high peat moss proportions, and help prevent root damage be to less drainage and high water holding capacity during the winter.

So often better it is, so take a block of compressed coconut fiber and a bag of lava (Seramis) and mix at home to a basic potting mixture, beneficial for citrus.

Usually it can be needed, to wash out all of the hard, compact and dense loam around the roots, and then rinse the new potting mix with a hose or watering can between the roots.

## Adding organic fertilizers

Most self made citrus potting mixtures do not contain organic nutrient sources.

So addition of organic nutrition sources are beneficial, as sometimes a mycorrhizal fungus can be added, to ensure best root performance and development.

Root mycorrhizal fungus are in citrus usually the Glomus species, and can be added to the potting mixture. The fungus will penetrate the outer root cells, and provide a higher root surface and ensure a better uptake of nutrients, especially phosphorus.

Other organic nutrient sources, like lupine seeds, dolomite limestone, horn splinters, composted manure are very beneficial and should be considered.

## Citrus News

With Limette No. 13 the after-least Limette is published. Number 14 will discuss the theme about Rootstocks for ornamental Citrus trees, especially for those grown in containers.

About the theme for Number 15 the autor is has choosed to do a budding tutorial. Two budding methodes, Inverted T-Budding and Chip-Budding will be shown, and for the first time a future issue was published, before this issue was 'out'....

Furthermore the interest in this publication has still decreased, and the continue of it was worth discussion, because the time consuming labor for pictures, text files and editing are not covered by

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A Bad loamy mixture is used. Hard and not really good aerated it will lead often to severe root disturbances and root problems.

demand or interest. The autor has found, to continue the publication, but will not depend furthermore in the run for two issues per year, and will decrease the publishing times to annually and not to fixed dates. Because the work for this issue has taken weeks to get the plain text, but to get the pictures took months, because just to present pictures fitting to the theme, often archive pictures does not cover the theme, so new pictures must be taken, which fit better to layout and theme. So the taking of new pictures is an extreme time consuming labour, thus the publishing date in spring for Limette wasn't possible.

Now after months this issue goes to finish, with a delay of about 12 months. But the decreased interest shows up, that this delay won't bother anyone, so the autor takes more time in research and the time consuming labour for new issues.

## About News:

The Citrus weekend 2006 at Mannheim Luisenpark was really good frequented. Usually more people than the last year came on Sunday, To follow the guide throught the small yard and listen to the explanations about citrus. Saturday was still used, because of the Luisenpark Midsummer Festival the people decided to visit the park later, rather to join and visit the Citrus Garden.

So the Park Administration thought in 2007 to held again Citrus days, but don't combine with an other festival, to let the focus on Citrus, just to get more people to this small collection.

Sunday at those days most people discussed about fertilisation and lime tolerance of Citrus, and most were informed about the high lime tolerance of certain rootstocks and usally most growing backdraws by only using water containing low calcium and magnesium.

Still in 2007 this was discussed, but with the new studies from Dr. Molitor from the Research station at Geisenheim of the University of Wiesbaden the high calcium demand of Citrus was proved and his fertilizer recommendation were also foundation for many valuable discussions. But also highly discussed was the potting mixture, and after all, this lead to this issue.

In 2008 again Citrus days were hel on a weekend in Manheim at the Luisenpark, and let's see what on discussions, questions and demands the focus is, so maybe it's another valueable source for a new Limette.

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Even sandy potting mixtures, high in calcium by dolomite, lime stone or coral particles will together with the correct rootstock do ver well. Those soils do very good, if watering and fertilizer shedules are well maintained, and pH tolerant rootstocks are used