Coco Coir vs Rockwool in Soilless Crops

Choosing the right substrate is critical in greenhouse hydroponics. Coconut coir (coco peat) has become a renewable alternative to rockwool, and recent studies show it can match or exceed rockwool in many crops. In cucumbers, switching to coir improved leaf area and marketable yield (1). In tomatoes, coir supported higher fruit yield and nutrient uptake than rockwool (2). In leafy greens, lettuce in coco peat produced more biomass than mineral wool or perlite in controlled greenhouse trials (3). Even strawberries have shown equal or better performance in coir compared to rockwool when root-zone aeration is properly managed (4).



A 70:30 coco/perlite blend, one of the best blends to use in soilless cultivation, especially for plants with high oxygen demand

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- **Tomato:** Coir gave higher yields and heavier fruits than rockwool. Plants on coir had significantly greater uptake of potassium and sulfur, translating to larger fruit and more total yield (2).
- **Cucumber:** Coir boosted growth and yield compared to rockwool. Leaf area index and final yield were consistently higher on coir (1).
- **Lettuce:** Coco peat produced ~40% higher leaf biomass than perlite and ~70% higher than mineral wool in one ebb-and-flow greenhouse study (3). In another greenhouse system, rockwool gave the heaviest fresh biomass, but coir produced taller plants and longer roots (5).
- **Strawberries:** Over six months of pot cultivation, strawberries grown in coir matched or outperformed rockwool in shoot dry weight, while showing more stable drainage EC and pH (4). Extension reports and grower trials further suggest blends of coir with perlite improve aeration and flowering compared to pure coir (6).

Crop Comparison Table

Crop	Rockwool Yield	Coco Coir Yield	Notes/Ref
Tomato	Lower	Higher (2)	Heavier fruit, greater K and S uptake
Cucumber	Lower	Higher (1)	Higher LAI, yield, nutrient levels
Lettuce	Moderate	Higher (3) (5)	Coco peat surpassed mineral wool in one study; rockwool still led in fresh biomass in another

Crop	Rockwool Yield	Coco Coir Yield	Notes/Ref
Strawberry	Variable	Equal or higher (4) (6)	Coir stable for EC/pH; blends improve aeration

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Tomatoes on Coir vs Rockwool

In the tomato trial by Xiong et al., coir substrates significantly outperformed rockwool. Plants in coir had higher total fruit yield, greater average fruit weight, and better uptake of key nutrients such as K and S (2). This demonstrates that coir is not just a substitute but a potentially superior medium for greenhouse tomato production.

Cucumbers on Coir vs Rockwool

In greenhouse cucumbers, coir consistently gave higher vegetative vigor and fruit yield. Leaf area index and final yields were significantly higher than on rockwool (1). Nutrient analysis also showed higher Ca, Mg, and Zn contents in coir-grown plants, suggesting coir buffers nutrients more effectively.

Lettuce and Leafy Greens

In Polish greenhouse trials, coco peat lettuce heads produced substantially more leaf biomass than those grown in mineral wool or perlite (3). In contrast, a Philippine hydroponic

study found rockwool produced the heaviest fresh biomass, but coco coir gave taller plants and longer roots (5). Together, these results show coir can rival or surpass rockwool, but outcomes depend on system design and cultivar.

Strawberries on Coir vs Rockwool

In Korea, a six-month hydroponic strawberry trial showed that coir matched or outperformed rockwool in shoot dry weight, while maintaining more stable EC and pH in drainage solutions (4). Practical experience also suggests that coir blended with perlite is best for strawberries, as it improves root aeration and prevents waterlogging (6). For crops that have roots that require high oxygenation, perlite amendments are fundamental to the use of coco coir for optimum results.

Coco/Perlite Blends

Many growers prefer mixing coir with perlite to improve aeration. This is especially useful for crops like strawberry, which are sensitive to low oxygen in the root zone. A 70:30 coir:perlite ratio is widely used to combine coir's nutrient buffering with perlite's porosity. **These blends often outperform pure rockwool in practice**.

Summary

Greenhouse research consistently shows that **coir is a strong alternative to rockwool**. Tomatoes and cucumbers perform better

on coir, lettuce often produces more biomass, and strawberries grow well provided aeration is managed. Coco/perlite blends add further reliability. For growers aiming to reduce reliance on rockwool, coir and its blends represent a proven, effective option that can sustain or increase yields while offering better root-zone stability.

How to reuse your coco coir in soilless growing

Why reuse media

Buying new media and spending labor to mix, expand, and even amend it can be a costly process for growing facilities. Dumping media also involves going through a composting process, wasting nutrients that are already present in that media when it is thrown away. However, media in hydroponics serves a mostly structural role and there are no fundamental reasons why media like coco cannot be recycled and used in multiple crop cycles.



Coco coir commonly used as a substrate in soilless agriculture.

By reusing media, a grower can substantially reduce operational costs. This is because the media itself often contains an important amount of surplus nutrition and the roots and other organic components left behind by previous plants can also be used by new crops to sustain their growth. These added decomposing root structures also reduce channeling in the media and help improve its water retention as a function of time. After a media like coco is reused several times, the coco also degrades and becomes finer, further improving water retention.

Why media is often not reused

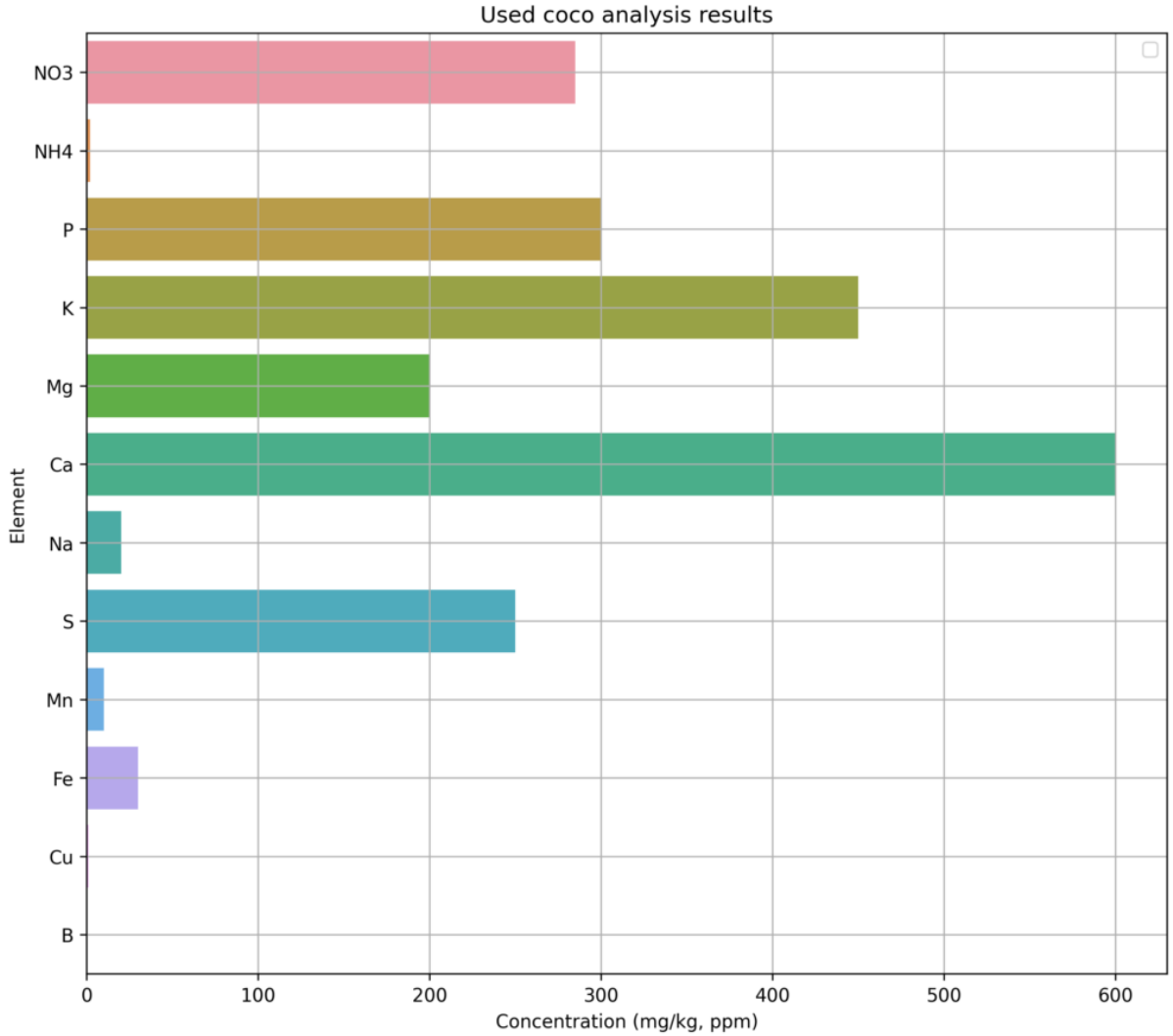
Reusing media is not without peril. When media is pristine, it is more predictable. You know its basic composition and you can feed it the same set of nutrients and hope to obtain very similar results. Nonetheless, after media goes through a growing cycle, its chemical composition changes and the starting point becomes much more variable. This means that a grower needs to somehow adjust nutrition to the changes in composition, which can often make it difficult for the crop to

achieve consistent results.

If a grower reuses media but tries to feed as if the media was new, then problems with overaccumulation of nutrients in the media will happen and it will be hard for the grower to obtain reliable results. Reusing media requires a different approach to crop nutrition which scares people away because it strays from what nutrient companies and normal growing practices require. However we will now learn how media is chemically affected by cultivation and how we can take steps to reduce these effects and then successfully reuse it.

Media composition after a normal crop

In traditional coco growing, fertilizer regimes will tend to add a lot of nutrients to the coco through the growing cycle. From these nutrients, sulfates, phosphates, calcium and magnesium will tend to aggressively accumulate in the media while nutrients that are more soluble like nitrate and potassium will tend to accumulate to a lesser extent or be easier to remove.



Analysis of used coco from a tomato crop. This analysis uses a DTAP + ammonium acetate process to extract all nutrients from the media. This media had a runoff pH of 6 with an EC of 3.0 mS/cm.

The above image shows you the analysis results of a coco sample that was used to grow a tomato crop. In this analysis, the media is extracted exhaustively using a chelating agent, to ensure that we can get a good idea of all the cations that are present in the media. The chelating agent overcomes the cation exchange capacity of the media, forcing all the cations out – fundamentally exchanging them for sodium or ammonium – and showing you the limits of what could be extracted from the media by the plant.

In this case, the amount of Ca is so high, that it can fundamentally provide most of the Ca required by a plant through its next growing period. Since most of this Ca is

going to be present as calcium sulfate and phosphate, it will only be removed quite slowly from the root zone by leachate. The amount of potassium is also quite high, but this potassium is going to go out of the media quite easily and is only likely to last for a short period of time.

In addition to the above mineral content, coco that is reused will often contain a lot of plant material, roots that remained from the previous crop, so the subsequent reuse of the media needs to incorporate adequate enzymatic treatments to help breakdown these organics and ensure that pathogens are not going to be able to use these sources of carbon as an anchor point to attack our plants.

Steps before the crop ends

Because of the above, one of the first steps we need to carry out if we want to reuse media is to ensure that the media is flushed during the last week of crop usage with plain water, such that we can get most of the highly soluble nutrients out of the media so that we don't need to deal with those nutrients in our calculations. This will remove most of the nitrogen and potassium from the above analysis, giving us media that is easier to use in our next crop.

In addition to this, we will also be preparing our media for the digestion of the root material. Before the last week of cultivation, we will add pondzyme to our plain water flushing at a rate of 0.1g/gal, such that we can get a good amount of enzymes into our media. We should also add some beneficial microbes, like these probiotics, at 0.25g/gal, so that we can get some microbial life into the media that will help us decompose the roots after the plants that are currently in the media will be removed.

How to manage the new crop

Once the crop ends, we will remove the main root ball from the media. There is no need to make an effort to remove all plant material as this would add a lot of labor costs to media reuse. The media should then be allowed to dry, such that the roots that are left behind can then be easily broken up before new plants are placed in the media. Machines to breakup any roots are ideal, although this can also be done manually and easily once all the root material in the media is dead and the roots lose their capacity to hold their structure together.

Once we have dry coco with the root structures broken up, we can then fill up new bags to reuse this media for our next crop. After doing a lot of media analysis and working with several people reusing media, I have found this method works well. If we performed the flushing steps as instructed before, then we can use the media runoff EC as a way to evaluate the type of nutrition needed.

While the runoff EC remains above *1.5mS/cm*, we feed a solution containing only potassium nitrate and micronutrients (no phosphorus, sulfates, calcium or magnesium) at 2g/gal of KNO_3 + micros. After the runoff EC drops below 1.5mS/cm we return to feeding our normal regime. The idea here is that while the media is above 1.5mS/cm the plant can take all the nutrients it needs from the media, but once the media EC drops below 1.5mS/cm, the media is deprived from these nutrients and we need to provide them again for the plant.

Bear in mind that while the nitrogen content of the above feed seems low (just 73 ppm of N from NO_3) there is additional nitrogen that is coming from the decomposition of the organic materials left in the media, which can supplement the nitrogen needs of the plants. Despite the flushing on the last week, there is always some nitrate left from the previous crop. I have found that this is enough to support the plant until the

runoff drops below our 1.5mS/cm threshold. After this point, the plant can be grown with its normal nutrition.

Simple is better

Although you would ideally want to find exactly which nutrients are missing or present after each batch of media and adjust your nutrition such that you can get your plants the ideal nutrient composition every time, this is not cost effective or required in practice to obtain healthy plant growth. A media like coco possesses a good degree of nutrient buffering capacity (due to it’s high cation exchange capacity and how much nutrition is accumulated after a crop cycle), so it can provide the plants the nutrition of certain nutrients that they need as long as the nutrients that are most easily leached (K and N) are provided to some degree.

The above strategy is simple and can achieve good results for most large crops that are grown using ample nutrients within their normal nutrient formulations. It is true that this might not work for absolutely all cases (or might need some adjustments depending on media volumes) but I’ve found out it is a great strategy that avoids high analysis costs and the need to create very custom nutrient solutions.

Do you reuse your coco? Let us know which strategy you use and what you think about my strategy!

Using coco coir in

hydroponics

Side by side with peat moss, coco coir is one of the most commonly used media in hydroponic culture. Its excellent root propagation and aeration properties, coupled with its adequate water retention, make it an ideal medium for hydroponic culture. Nonetheless, there are several issues that can arise when using coco coir, particularly due to its chemistry and variability. Today we are going to talk about using coco coir in hydroponics, what the main problems with coco can be and how these problems can be avoided.



EC and pH values for different coco coir sources

Coco coir is basically ground up dried palm tree husks. Although it is organic, it is much more fibrous than peat moss and for this reason, it does not suffer from some of the pH and decomposition issues commonly found with peat. Although coco is biodegradable, its decomposition can take more than 20 years, reason why it is a suitable media for hydroponics. It can even be used several times within a hydroponic crop in order to save production costs, as long as plant material is removed and the media is properly treated between crops.

Since coco coir comes from large plants grown across a variety of different conditions, the actual chemical makeup of the coco can change very substantially. The table above shows the pH and EC of different coco coir sources. As you can see, we have everything from an EC of 0.1 mS/cm to an EC of 0.9 msS/cm, with pH values that cover anything from 4.9 to 6.8. This is mainly due to the big variations in the ions contained within the coco and how these ions interact with the plant material.

Coco coir also has a high cation exchange capacity, meaning that it can retain large amounts of ions. These are only taken out if they are replaced by others with stronger affinity for

the media or when strong interactions with chelating agents are possible. This is generally why coco is treated with calcium nitrate solutions, to remove many of these ions from the media structure and allow the media to be as neutral as possible when used in hydroponic culture. However, many coco producers do not treat the media at all – or simply wash it with plain water – leaving a lot of potassium and sodium within the coco that needs to be accounted for. A lot of micro nutrients that are tightly bonded to cation exchange sites are often also often present inside the coir.





Some of the chemical properties of different coco coir sources

If you want to ensure your coco is as neutral as possible in terms of nutrients, you can extract it with a 1 g/L solution of calcium nitrate and then with 2g/L of tetrasodium EDTA. This will extract both macronutrients that are exchangeable for Calcium, and micro nutrients that can be extracted when using EDTA. The EDTA step is important, as coco can hold a large amount of micro nutrients within it, that can be exchanged and used by the plant. If you want your nutrients to all come from solution you will need to remove these contributions from the media. After this, you will then want to run plain water to remove any excess Ca and EDTA and then run your full strength nutrient solution for a few days. This will strip the coco from excess ions and equilibrate the cation exchange sites with your nutrient solution's composition.

Note that these steps aren't necessary to grow successfully with coco, but they can give the grower more control over the nutrients received by the plants. You can alternatively run nutrient solution through the coco and then perform an analysis of the output, so that you can compensate for the nutrients that are given by the coco through the growth cycle.

This of course means that you need to spend money doing solution analysis through the crop’s life to ensure that you’re adequately compensating for the coco’s contributions through the entire growing period.

When properly treated, coco can be a very good media for growing hydroponic crops. The larger aeration, better chemical stability and fibrous structure makes it better for root growth than most peat moss sources. Yields for several plants are also often larger or just as good in coco when compared with peat moss. The lack of important decomposition during growth cycles is also a big advantage over peat, as important drops in pH due to media decomposition can be avoided and the media can be more readily recycled.