# A Comparative Study of Peat Moss and Coco Peat as Base for Truffle Spore Amendment Substrate

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INOCUBLOC™
TRUFFLE FARM SUBSTRATE

## Introduction

The truffle farming industry widely acknowledges the important role of annual peat-based spore amendments in ensuring the production of high-quality truffles in commercial quantities. Typically performed after the harvest season and before the growing season, these spore amendments serve a dual purpose.

Firstly, they facilitate the introduction of essential opposite sex spores (either MAT-1 or MAT-2) critical for initiating the vital process of sexual reproduction in truffles. The peat substrate plays an important role in evenly dispersing these spores, especially when adhered to an additive such as vermiculite, which enhances spore distribution.

Secondly, these amendments create an aerated and non-compacted "nest" environment that fosters the development of superficial roots and provides the optimal conditions for truffles to grow into the coveted spherical shape highly esteemed in culinary circles.

This study aims to provide truffle farmers with the knowledge necessary to make well-informed decisions regarding the choice of material best suited to their preferences and specific farming requirements.

## Why Coco Peat?

Peat moss serves as a prominent component in horticultural substrates, valued for its lightweight, airy properties, and its capacity to retain water and nutrients. However, the use of peat moss is not without significant drawbacks, including:

1. **Non-renewability**: Harvested through the drainage and depletion of delicate ecosystems known as peatlands or peat bogs.

2. **Environmental Impact**: Damaged or drained peatlands worldwide release billions of tons of carbon dioxide annually, making a substantial contribution to greenhouse gas emissions.

3. **Regulatory Jeopardy**: Governments, including the EU and UK, are planning to ban the use of peat moss due to its adverse environmental effects.

Derived from the fibrous pith of coconut husks, known as coir, coco peat is a naturally occurring, organic byproduct. It distinguishes itself with attributes such as sustainability, renewability, and widespread availability. In recent years, coco peat has emerged as a viable alternative to peat moss across various applications. As concerns regarding the use of peat moss continue to grow, it becomes imperative to conduct a thorough comparative assessment of these two materials as potential substrates for truffle spore amendment.

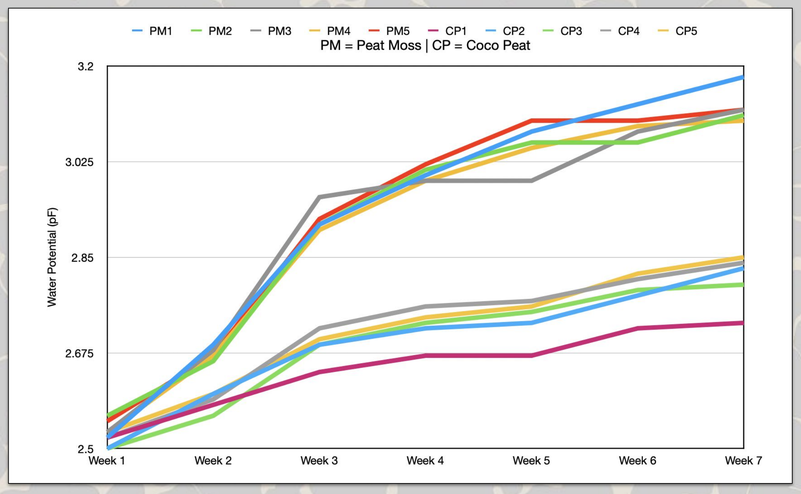
## Moisture Experiment

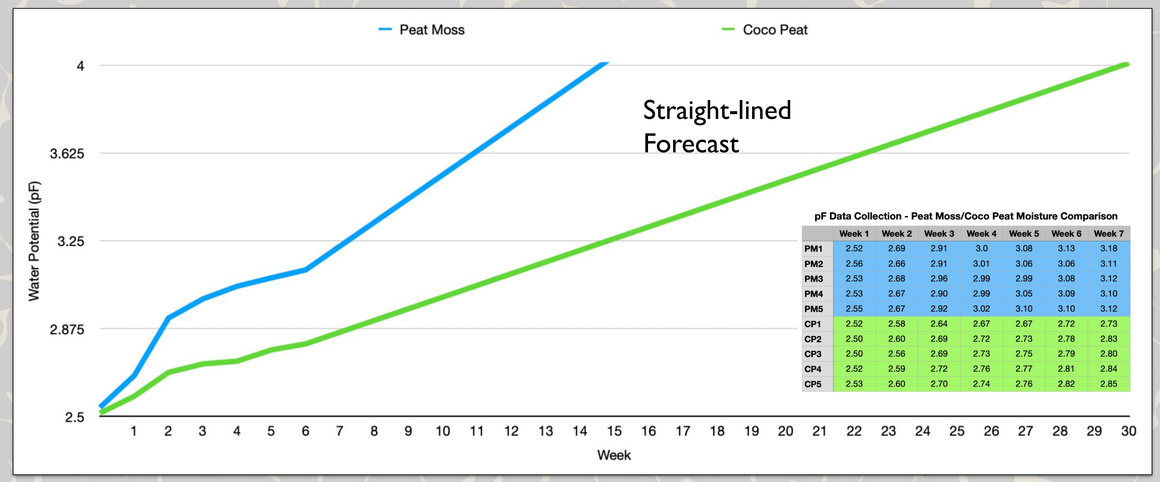
- Setup: Soak bulk peat moss and coco peat in separate large containers overnight, then fill five baskets with saturated peat moss and five mesh baskets with saturated coco peat with primed gypsum sensors carefully positioned in middle. Allow baskets to drain to “field capacity.” Take pF measurements for each basket every Saturday over the course of the next 6 weeks.


**Coco Peat**
Supplier: PlantBest
Brand: BeatsPeat Coconut Coir
Country of Origin: India
Manufacturer Specifications:
EC: < 0.5 mS/cm
pH: 5.5 - 6.8
Lot #: 030721


**Peat Moss**
Supplier: Premier Tech Ltée
Brand: Sphagnum Peat Moss Tourbe
Country of Origin: Canada
Manufacturer Specifications:
EC: 0.09- 0.13 mmhos/cm
pH: 3.8-4.2
Lot #:220823528

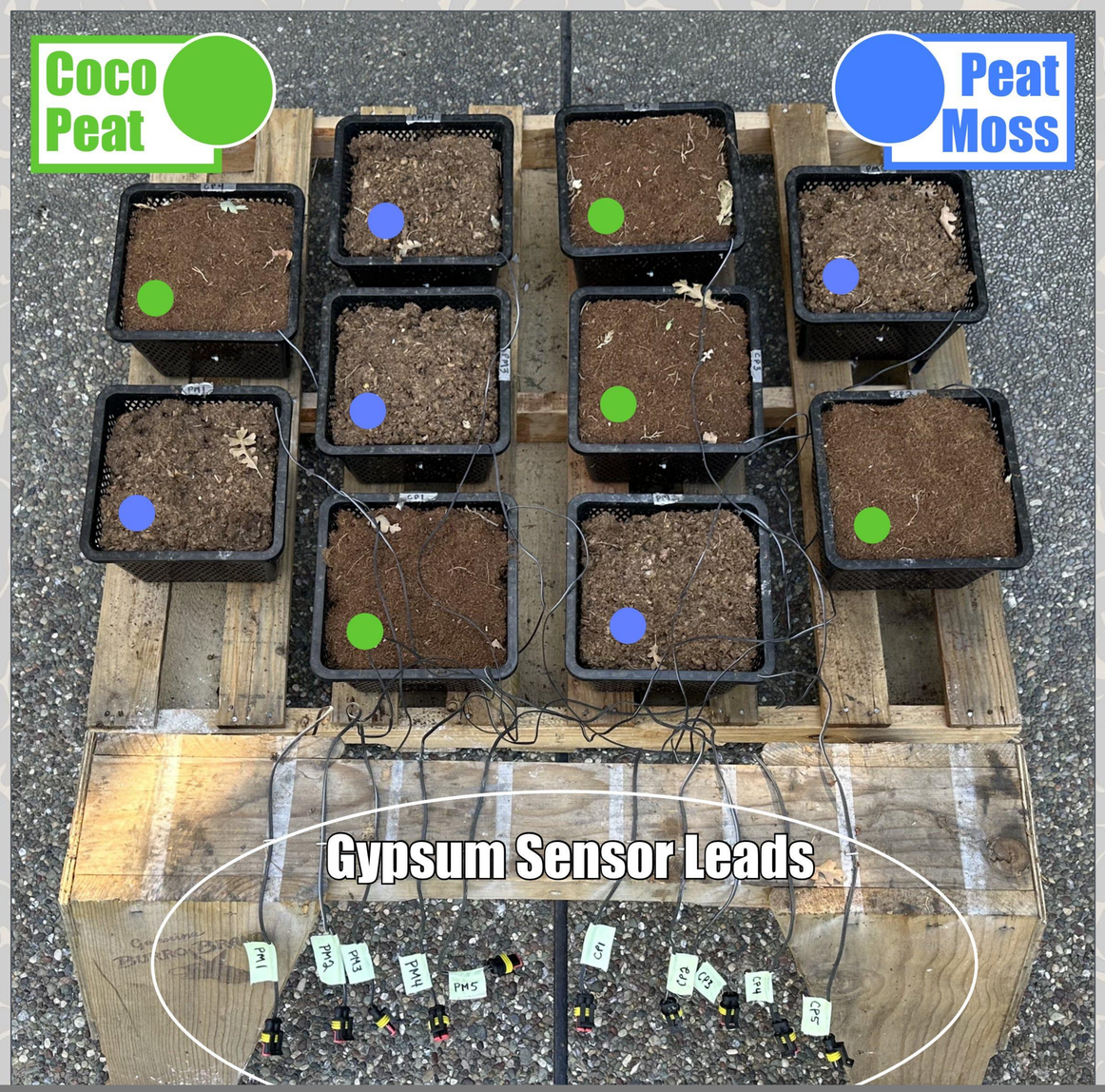
| Physical Characteristics & Analytical Results | | Peat Moss | Coco Peat |
|---|---|---|---|
| pH | | 4.10 | 6.29 |
| Electrical Conductivity (EC) | mS/cm | 0.18 | 0.26 |
| Total Dissolved Salts | ppm | 115.20 | 166.4 |
| Percent Moisture | % | 23.20 | 79.86 |
| Bulk Density Dry | kg/m3 | 106 | 144 |
| Organic Matter | % | 99.8 | 99.4 |
| C/N Ratio | : | 34.1 | 31.9 |
| Total - N | % | 1.52 | 1.45 |
| Ammonia - N | ppm | 85.9 | 2.4 |
| Phosphorus - P | % | 0.02 | 0.03 |
| Phosphorus - P205 | % | 0.05 | 0.07 |
| Potassium - K | % | 0.01 | 0.51 |
| Potash - K20 | % | 0.01 | 0.61 |
| Sulfer - S | % | 0.07 | 0.03 |
| Magnesium | % | 0.25 | 0.32 |
| Calcium | % | 1.15 | 0.92 |
| Sodium | ppm | 88.65 | 1478.08 |
| Copper - Cu | ppm | 1.92 | 5.51 |
| Iron - Fe | ppm | 857.08 | 2343.10 |
| Manganese - Mn | ppm | 18.83 | 62.13 |
| Zinc - Zn | ppm | 6.78 | 50.86 |




pF Data Collection - Peat Moss/Coco Peat Moisture Comparison

| | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 | Week 7 |
|---|---|---|---|---|---|---|---|
| PM1 | 2.52 | 2.69 | 2.91 | 3.0 | 3.08 | 3.13 | 3.18 |
| PM2 | 2.56 | 2.66 | 2.91 | 3.01 | 3.06 | 3.06 | 3.11 |
| PM3 | 2.53 | 2.68 | 2.96 | 2.99 | 2.99 | 3.08 | 3.12 |
| PM4 | 2.53 | 2.67 | 2.90 | 2.99 | 3.05 | 3.09 | 3.10 |
| PM5 | 2.55 | 2.67 | 2.92 | 3.02 | 3.10 | 3.10 | 3.12 |
| CP1 | 2.52 | 2.58 | 2.64 | 2.67 | 2.67 | 2.72 | 2.73 |
| CP2 | 2.50 | 2.60 | 2.69 | 2.72 | 2.73 | 2.78 | 2.83 |
| CP3 | 2.50 | 2.56 | 2.69 | 2.73 | 2.75 | 2.79 | 2.80 |
| CP4 | 2.52 | 2.59 | 2.72 | 2.76 | 2.77 | 2.81 | 2.84 |
| CP5 | 2.53 | 2.60 | 2.70 | 2.74 | 2.76 | 2.82 | 2.85 |




## pF in Trufficulture

The term "pF," which stands for potential force, is employed in the context of trufficulture to quantify soil water potential or soil suction. In this context, it serves as an indicator of the energy required by the roots of trees to draw water from the soil. Soils with lower pF values indicate higher moisture content, while soils with higher pF values signify drier conditions.

WETRUF, a company based in Nancy FRANCE, has developed a suite of tools under the pF Tracer product line tailored for practical application in the field. These tools have been specially calibrated to provide pF measurements within the range relevant to truffle cultivation, specifically encompassing the transition between “field capacity” (approximately pF 2.5) and "wilting point" (around pF 4.2). The development of the pF Tracer One was grounded in research conducted at the INRAE Institute. This research concluded that, in the context of trufficulture, when the pF value attains a level of 4, the remaining water within the soil porosity becomes too challenging for both trees and fungi to extract.


## Results and Observations

**Stability and Variation**: Both peat moss and coco peat show reliably stable moisture retention over time. Coco peat consistently has lower pF values compared to peat moss.

**Forecast**: By straight-lining the collected data, it is estimated that it would take peat moss approximately 15 weeks to reach 4.0 pF and coco peat approximately 30 weeks.

**Physical Characteristics**: pH is higher in coco peat at 6.29 compared to that of peat moss at 4.10. Therefore it will be easier to increase the pH of coco peat, especially considering that peat moss has a comparatively high buffering capacity which refers to its natural ability to resist changes in pH.

**Chemical Analysis**: Sodium is higher in coco peat (1478.08 ppm) compared to that of peat moss (88.65). Therefore monitoring of sodium levels and health of trees should be monitored. Generally speaking, mature trees are more tolerant to sodium stress than newly planted trees.

**NOTE:** As an industry norm, coco peat undergoes a washing process before being marketed for horticultural applications. It is worth noting that unwashed coco peat tends to exhibit a higher EC due to salt concentration, primarily attributed to the tropical regions where coconuts are cultivated.

**FUTURE RESEARCH**: Extending the study duration can provide a more thorough assessment of long-term moisture retention in these substrates. Furthermore, future investigations could explore how these substrates perform in natural environments, especially in the presence of moisture-extracting trees.

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