Coconut Coir as Potting Soil Alternative to Peat: Biochar, Wool Pellets, and Wollastonite as Soil Amendments

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Abstract

Coconut coir has potential as a peat replacement in potting soil. Biochar, wollastonite, and wool pellets could be possible soil amendments in combination with coir as base growing media to reduce or eliminate the use of peat. Peat has characteristics that are beneficial for crop growth in agriculture; however, mining peat is harmful to the environment because it releases greenhouse gas emissions in the form of carbon dioxide. Decreasing the amount of peat that is mined could have a positive impact on the environment because it will allow peatlands to prosper and continue sequestering carbon, instead of releasing carbon into the atmosphere. Coconut coir was evaluated as an alternative to peat – with and without wollastonite, biochar, and wool pellet amendments – for kale seedling production. A blend of coir and peat produced better growth than growing media based on either coir or peat. No amendment consistently improved growth, but an interaction was detected between growing medium base and amendment, with biochar and wollastonite amendments offering some advantage in blends of peat and coir.

1. Objectives

The objective of this study is to find potting soil alternatives to peat by testing coconut coir and vermicompost as base growing media, and biochar, wool pellets, and wollastonite as soil amendments. Mining peatlands creates many problems for the environment as the process causes sequestered carbon to oxidize and be released into the atmosphere as carbon dioxide, a greenhouse gas (FAO 2019). Peat is a relatively cheap, yet unsustainable resource, widely used in agriculture (FAO 2019). Finding sustainable alternatives to peat could allow crop growth that does not impede on the environment and further contribute to climate change.

2. Literature Review

2.1 The advantages and disadvantages of peat

Peatlands form in wetlands such as bogs, mires, and fens. Peatlands are critical carbon sinks, as they store vast amounts of organic matter accumulated over thousands of years (FAO 2019). Despite covering only about 3% of the Earth's land surface, they hold approximately 30% of the world's soil carbon—more than all other vegetation types combined (FAO 2019). When peatlands are disturbed by fire, clearing, or drainage, they release carbon dioxide and methane, which are greenhouse gases (FAO 2019; Strack et al. 2024). Draining peatlands alters flood control, biodiversity, and nutrient cycling (Fluet-Chouinard et al. 2023). Agriculture is one of the main contributors to the lowering of water tables in peatlands because the land is converted to cropland (Fluet-Chouinard et al. 2023).

By some estimates, 70% of the world’s peatlands have been lost due to the conversion to croplands and artificial wetlands, drainage, soil degradation, and more (Cao 2019; Fluet-Chouinard et al. 2023). Peat is also mined from drained wetlands for use in potting soil, due to its suitable physical and chemical properties for growing crops in agriculture (Cao 2019). Peat has a high organic matter content, but a low nutrient content, so it is typically amended with fertility to supplement nutrients (Cao 2019; M. Bomford, personal communication). It provides good soil aggregate structure and can manage pH levels in soils because of its richness in humic acid (Cao 2019). Peat has a porous structure and a large specific surface area, so it has a high adsorption and chelating capacity (Cao 2019). Finding alternative growing media with similar characteristics to peat could help protect peatlands and reduce global warming.

2.2 Growing media alternatives to peat

2.2.1 Vermicompost

Vermicomposting is a process where earthworms are used to eat organic residues to digest and excrete the residues in aerobic conditions into a product called vermicompost (Tammam et al. 2022). Vermicompost is a renewable resource because it reduces organic waste by turning it into a fertilizer that can be used to grow crops (Blouin et al. 2019). Food waste is becoming a large problem due to a lack of sustainable disposal procedures. A World Bank study expects an increase in urban solid waste of up to 70% by 2025 (Blouin et al. 2019). This means there would be 2.2 billion tons of urban solid waste costing $375 billion worldwide in one year, and organic waste accounts for 30% of the total solid waste (Blouin et al. 2019). The transformation of organic wastes into organic resources can be a way to recycle some of these waste products, while simultaneously providing an agricultural climate solution.

Earthworm castings are rich in humus, so they have abundant macro and micronutrient availability, good water holding capacity, and strong cation exchange capacity (Tammam et al. 2022). Humus also decreases bulk density, increases pest resistance, and helps plants build a tolerance to salt stress (Tammam et al. 2022). Vermicompost acts as an organic fertilizer because of its nitrate availability, growth hormones, nitrogen fixing, and phosphate-solubilizing ability (Tammam et al. 2022). Actinomycetes and bacteria production increase as they move through an earthworm's gut, allowing for nitrogen fixation to occur through the excreta in the form of vermicompost (Adhikary, 2012). Most of these physical and chemical properties provide similar benefits to soil that peat currently supplies; however, peat lacks the nitrogen fixing ability.

2.2.2 Coconut coir

One potential peat alternative is a waste product from the coconut industry that can be recycled and reused in agriculture called coconut coir. Coir has similar physical and chemical properties to peat (Kuepper and Everett 2004), but Arenas et al. (2022) found that coconut coir was less acidic than peat, had a higher electrical conductivity, and had similar organic matter content (>90%) and mineral content (<10%). The high organic matter content gives coir good water holding capacity, adsorption capacity, and nutrient availability (Arenas et al. 2022). The study also found that tomato plants grown in coir media produced the same or better yields to tomato plants grown in peat media, suggesting that coir could be used as a sustainable base growing medium for food crops (Arenas et al. 2022).

2.3 Soil amendments

2.3.1 Wool pellets

Nitrogen tends to be the biggest limiting factor for plant growth; that is, the lack of nitrogen available to plants in the soil (Bradshaw and Hagen 2022). For organic farmers, this creates problems since organic fertilizers are costly and are in limited supply (Bradshaw and Hagen 2022). One solution to this problem could potentially be wool. The market cost of wool has dropped significantly in recent years (Bradshaw and Hagen 2022). For some farmers, the price is now less than the cost that they would pay to produce and transport their wool (Bradshaw and Hagen 2022). Shearing sheep is a requirement for sheep farmers to maintain the flock's health and survival, so finding a use for this waste wool on organic farms could resolve two issues: the unsustainable use of peat in agriculture and the need to shear sheep (Bradshaw and Hagen 2022). Bradshaw and Hagen's (2022) studies have shown that replacing synthetic fertilizers with wool in soils has improved water holding capacity, bulk density, nutrient availability, and soil aggregation.

West Coast Seeds supplies 270g bags of Wonder Wool Pellets for $14.99 per bag (West Coast Seeds 2024). The description for these wool pellets on West Coast Seeds' website says they are a natural fertilizer that is high in nitrogen and other soil nutrients (West Coast Seeds 2024). Wool pellets are fibrous, which allows them to slowly breakdown and release nitrogen (Bradshaw and Hagen 2022). This slow release avoids nitrate leaching and run off, so the nitrogen is not wasted when it is amended in the soil (Bradshaw and Hagen 2022). The website also states that the pellets increase aeration and soil porosity because they expand in water, which creates an optimal environment for root growth (West Coast Seeds 2024). The pellets can retain moisture since they can hold up to 3.5 times their weight in water and can wick away excess water to prevent overwatering (West Coast Seeds 2024). Since half the weight of wool is carbon, it performs similarly to peat in the process of carbon sequestration if it is amended into the soil (Bradshaw and Hagen 2022).

2.3.2 Biochar

Biochar is a charcoal product produced using pyrolysis, the process of burning woody or herbaceous materials in anaerobic conditions (Vaughn et al. 2015). Vaughn et al. (2015) substituted biochar for peat in potting soil substrates, and observed similar or better yields in tomato plants. In smaller capacities, biochar has been shown to increase the water holding capacity, pH levels, and ultimately, the growth rate of crops (Brtnicky et al. 2021). The significance of these properties to crop growth could allow biochar to amend soil and decrease or remove the need for peat.

Brtnicky et al. (2021) and Kuepper and Everett (2004) found evidence of biochar raising the pH levels in soils and neutralizing the acidity of peat, so that liming became unnecessary. However, studies have shown that biochar can also increase the pH of alkaline soils leading to an increase in soil salinity and a decrease in soil fertility due to nutrient leaching (Brtnicky et al. 2021). This could pose problems in my experiment because high doses of biochar could influence the water availability in the soil (Brtnicky et al. 2021).

2.3.3 Wollastonite

Wollastonite is a calcium inosilicate mineral that, when used as a soil amendment, goes through mineral weathering leading to carbon sequestration, and plant growth simultaneously (Haque et al. 2020). In relation to peat, which also sequesters carbon in peatlands and contributes to sufficient crop growth in agriculture, wollastonite could pose as a potential replacement. Wollastonite increases plant yield through fertilization, raises soil pH, and adds plant-available calcium and silicon to soil all while reducing greenhouse gas emissions (Haque et al. 2020).

My hypothesis is that transplants grown in vermicompost or coconut coir with soil amendments of biochar, wollastonite, and wool pellets will perform the same or better than transplants grown in peat-based media.

3. Materials and Methods

3.1 Materials & Growing Site

The experiment was conducted at the Kwantlen Polytechnic University's (KPU) Richmond (BC) campus on the Garden City Lands inside the passive Solar Growing Dome. All treatments were mixed, filled, and seeded inside the dome using KPU's potting soil recipe (Table 1). The base growing media and all other materials were sourced from KPU's Sustainable Agriculture Department. Biochar was donated by Georg Janssen from Preterra BioCarbon Solutions Ltd. Wool pellets were purchased by KPU from EcoWool Canada ($25/kg) and wollastonite was purchased from Natural Pigments ($24/kg). Kale seeds for the first and second trial were sourced from Adaptive Seeds and Johnny's Selected Seeds, respectively.

3.2 Methods

The methods used were similar to the methods shown in Rodighiero's (2019) research. Pots in plastic trays were used for seeding. The unamended peat treatment acted as the control and replicated the KPU potting soil recipe (Table 1) The growing media replaced peat in the same weight percentage as in the KPU potting soil recipe. The amendments biochar, wool pellets, and wollastonite were added as a 4% addition to KPU's potting soil recipe. The components of the recipe were weighed using a precision scale and a plastic cup. Each recipe was individually mixed in a tote bin and poured into a plant pot. The pots were placed in a plastic tray in a completely randomized factorial design.

Table 1. Kwantlen Polytechnic University's potting soil recipe (2024). Peat and amendment are written in bold to distinguish the ingredients that may or may not be replaced with growing media and amendment treatments.

Ingredient	Unamended Weight (%)	Amended Weight (%)
Peat	**53**	**51**
Perlite	20	19
Vermiculite	16	16
Limestone	1	1
Gaia 4-4-4 Fertilizer	4	4
Amendment	**0**	**4**
Coconut Coir	6	5

3.3 Experimental Design

Two trials were completed. The first trial ran for five weeks beginning on July 5th, 2024, and ending August 8th, 2024. The first trial was a completely randomized factorial design with seven base growing media and eight amendments, resulting in 56 different treatments (Table 2). The treatments were replicated two times for a total of 112 pots (Fig. 1). The growing media consisted of coconut coir, vermicompost, and peat as the control, as well as blends of all the media. The soil amendment factor included wool, biochar, and wollastonite, as well as blends of all the amendments. Each treatment was seeded with a kale crop (cv. Dazzling Blue Lacinato).

Table 2. Treatments used in first trial of experiment with different growing media and amendments. Base growing media include peat as the control, coir, vermicompost, a blend of peat & coir, peat & vermicompost, coir & vermicompost, and peat, coir, & vermicompost. The amendment levels include no amendments added, wool, biochar, wollastonite, a blend of wool & biochar, wool & wollastonite, biochar & wollastonite, and biochar, wool, & wollastonite. There are 56 different treatments and two replicates resulting in 112 pots.

Growing Medium Base	Amendments
Peat (100%)	None
Coconut Coir (100%)	Wool (100%)
Vermicompost (100%)	Biochar (100%)
Peat/Coir (50:50)	Wollastonite (100%)
Peat/Vermicompost (50:50)	Wool/Biochar (50:50)
Coir/Vermicompost (50:50)	Wool/Wollastonite (50:50)
Peat/Coir/Vermicompost (33:33:33)	Wollastonite/Biochar (50:50)
	Wool/Biochar/Wollastonite (33:33:33)

The second trial ran for seven weeks beginning on September 12th, 2024, and was completed on October 31st, 2024. The second trial of the experiment was a completely randomized factorial design with three base growing media and eight soil amendments, resulting in 24 different treatments (Table 3). Vermicompost was removed as a treatment in the second trial. The treatments were replicated three times for a total of 72 pots (Fig. 2). The pots were seeded with kale seeds (cv. Black Magic).

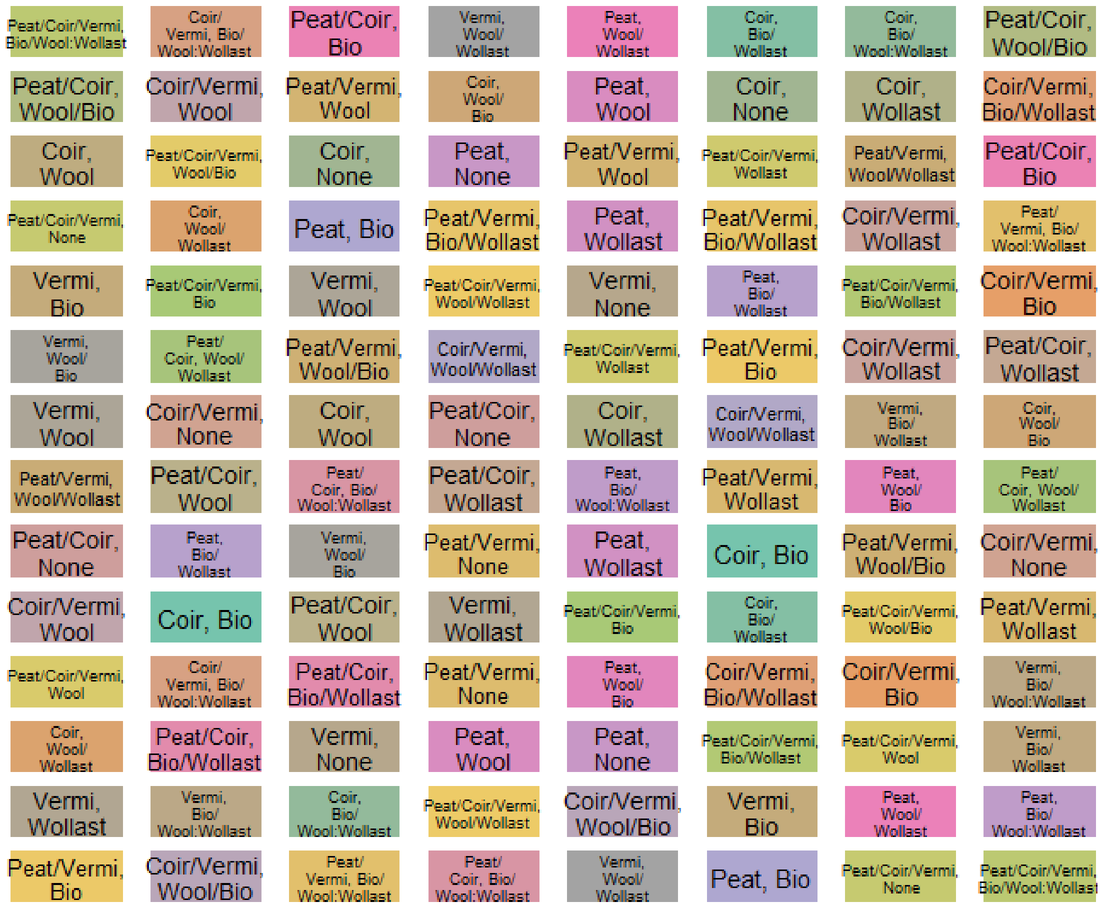

Figure 1. Completely randomized factorial design from first trial with 112 plots showing 56 combinations of base growing media and soil amendments and replicated twice.

Table 3. Treatments used in second trial of experiment with different growing media and amendments. There are 24 treatments and three replicates resulting in 72 pots.

Growing Medium Base	Amendments
Peat- 100%	None (N)- 100%
Peat/Coconut Coir- 50:50	Biochar (B)- 6%
Coconut Coir- 100%	Wool Pellet (WP)- 6%
	Wollastonite (WS)- 6%
	Biochar/Wollastonite- (B:WS)- 3:3
	Biochar/Wool Pellet (B:WP)- 3:3
	Wollastonite/Wool Pellet (WS:WP)- 3:3
	Biochar/Wollastonite/Wool Pellet- (B:WS:WP)- 2:2:2

Figure 2. Completely randomized factorial design from second trial showing combinations of base growing media and soil amendments.

3.4 Data Collection

Plants were harvested and fresh weights were collected after five weeks for the first trial. For the second trial, the transplants were harvested and cleaned after seven weeks, so that fresh weights could be recorded. The seedlings were placed in an air-forced oven for 72 hours to be prepared for dry weight and root and shoot measurements.

Leaf area measurements were taken three times throughout the second trial. The length and width of two leaves from a randomly selected transplant from each treatment were taken on October 11th, October 22nd, and October 31st of 2024.

3.5 Statistical Analysis

All data were tested for normality using the Shapiro-Wilk Test. Total dry weight (g) and root:shoot ratio data were analyzed by ANOVA. Leaf area data were analyzed using a Repeated Measures ANOVA with base and amendment as Between Subject Factors and dates (Oct. 11, Oct. 22, and Oct. 31) as Repeated Measures Factors. All analyses were conducted using the jamovi (v. 2.4.11.0) interface for R statistical software. Tukey's Honestly Significant Difference test was used to compare differences between treatments ($\alpha = 0.05$).

4 Results

The first trial was deemed unsuccessful, and the data are not presented in this paper. Half of the seedlings did not germinate due to a heat wave. Half of those that germinated were damaged by slug feeding resulting in only about 25% of the plants surviving and growing normally. The data were determined to be inconclusive and left out of this research paper. Vermicompost was removed from treatments because of its potential as a host for slugs. Results of the second trial are presented below.

4.1 Root:Shoot Ratio

Amendment had a significant effect on the root:shoot ratios of kale seedlings ($p = 0.021$) (Table 4, Figure 2). Base growing media had no significant effect ($p = 0.531$) and there was no interaction between base media and amendment ($p = 0.066$) on the root:shoot ratios of kale seedlings.

Table 4. ANOVA results on the effect of base growing media, amendments, and their interactions of root:shoot ratios (p > 0.05).

ANOVA - Root:Shoot (g)- LOG10

	Sum of Squares	df	Mean Square	F	p
Base	0.0282	2	0.0141	0.642	0.531
Amendment	0.4103	7	0.0586	2.666	0.021
Base ✻ Amendment	0.5567	14	0.0398	1.809	0.066
Residuals	1.0334	47	0.0220		

Root:shoot ratio was higher in media amended with biochar or biochar and wollastonite than in media amended with wool pellets ($p = 0.044$) (Fig. 2).

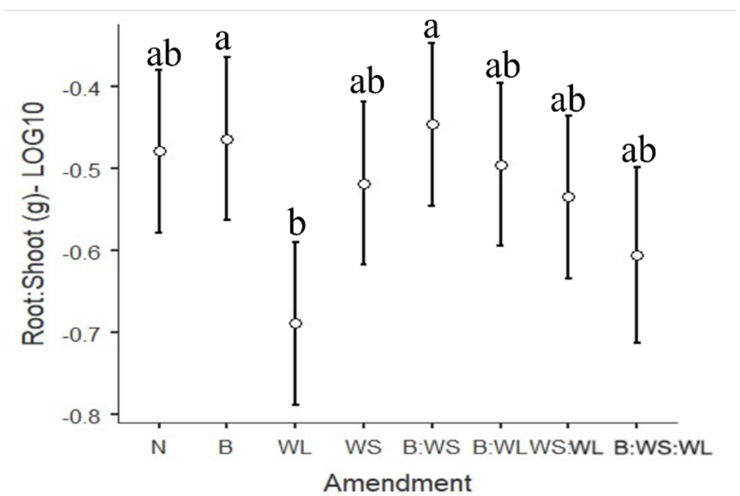

Figure 2. Root:Shoot weight ratio (log-transformed) of kale seedlings after seven weeks in different growing media. Amendments were biochar (B), wool (WL), wolastonite (WS), or none (N). Two-way (50:50) and three-way (33:33:33) amendment blends are shown as ratios. Bars labelled with the same letter do not differ significantly (p < 0.05).

4.2 Total Dry Weight

The total dry weight of kale seedlings differed between growing media bases (p = 0.005) and amendments (p = 0.021), and there was an interaction between these factors (p = 0.009) (Table 5).

Table 5. ANOVA results on the effect of base growing media, amendments, and their interactions on dry weights of kale seedlings.

ANOVA - Dry Weight- totals (g)

	Sum of Squares	df	Mean Square	F	p
Base	0.0242	2	0.01212	5.96	0.005
Amendment	0.0377	7	0.00539	2.65	0.021
Base ✻ Amendment	0.0722	14	0.00516	2.54	0.009
Residuals	0.0955	47	0.00203		

Dry weight was higher without any amendment than with blends of biochar and wollastonite or biochar, wollastonite, and wool (Fig. 3). No difference in dry weight was detected between the other amendments.

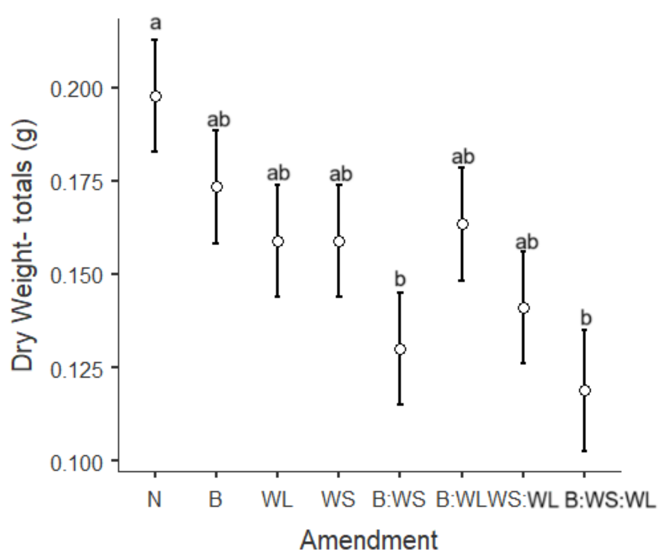

Figure 3. Dry weight (g) of kale seedlings after seven weeks in different growing media. Amendments were biochar (B), wool (WL), wolastonite (WS), or none (N). Two-way (50:50) and three-way (33:33:33) amendment blends are shown as ratios. Bars labelled with the same letter do not differ significantly (p < 0.05).

The total dry weight of kale was higher in the peat/coir blend than in media based on pure peat or pure coir (Fig. 4).

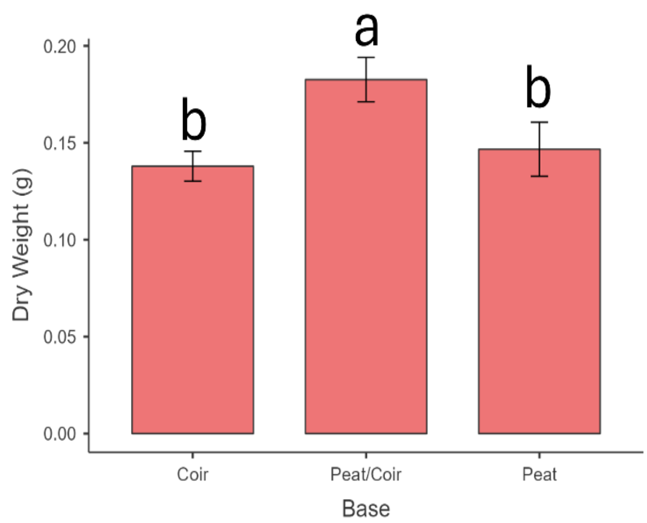

Figure 4. Dry weight (g) of kale seedlings after seven weeks in different growing media based on coir, peat, or a blend of peat and coir. Error bars denote 95% confidence interval. Different letters show statistically significant differences between base growing media means (Tukey's test, $p < 0.05$, $n = 24$).

There was a significant interaction between the effects of growing medium and amendment on total dry weight. Dry weight was highest when plants were grown in unamended peat, an unamended blend of peat and coir, or a blend of peat and coir amended with biochar or wollastonite. Dry weight was lowest when plants were grown in coir amended with a blend of biochar, wollastonite and wool; or in peat amended with wollastonite, a blend of biochar and wollastonite, or a blend of biochar, wollastonite and wool (Fig. 5). Other treatment combinations did not differ significantly from the highest or lowest treatments.

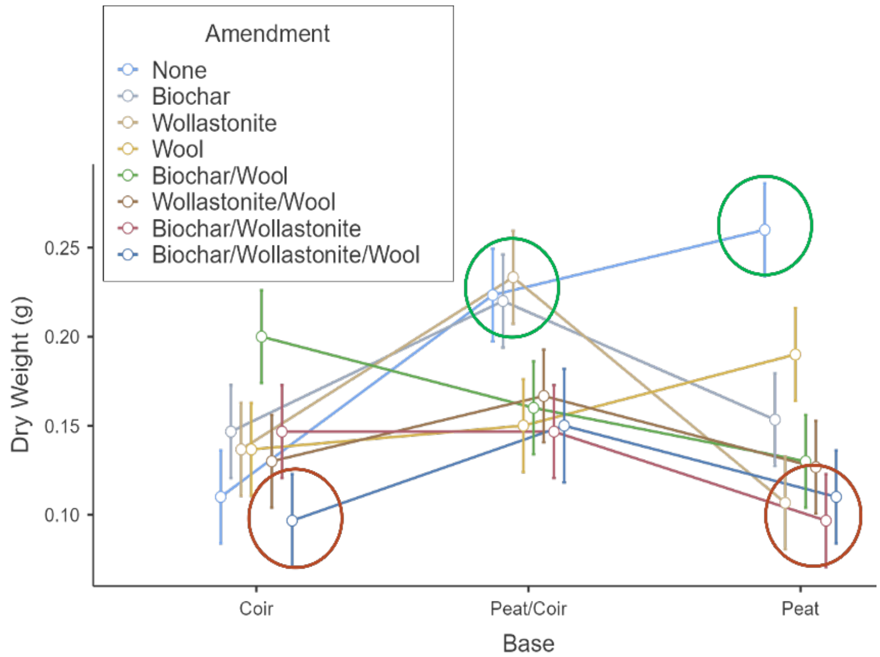

Figure 5. Interaction between base medium and amendment effects on dry weight of kale seedlings after seven weeks. Bars denote standard error. Highest means (inside green circles) are significantly greater than lowest means (inside red circles) (Tukey's test, α = 0.05, n = 3).

4.3 Leaf Area Measurements

Repeated measures ANOVA detected a strong effect of date on leaf area ($p < 0.001$), indicating kale growth over time (Table 6, Figure 7). Leaf area was also affected by media base ($p = 0.009$), amendment ($p < 0.001$), and interactions between base and amendment ($p < 0.001$). Leaves were larger on plants growing in a blend of peat and coir than in media based on either peat or coir alone (Figure 6).

Table 6. Repeated measures ANOVA tables showing tests for effects of date, base, and amendment on kale leaf area. Upper table tests for effects of date on leaf area, and all interactions between date and other factors. Lower table tests for effects of base and amendment on leaf area, and the interaction between base and amendment.

Within Subjects Effects

	Sum of Squares	df	Mean Square	F	p
Date	128.603	2	64.3014	444.145	< .001
Date ✻ Base	0.194	4	0.0484	0.335	0.854
Date ✻ Amendment	1.724	14	0.1231	0.851	0.614
Date ✻ Base ✻ Amendment	6.488	28	0.2317	1.600	0.049
Residual	13.609	94	0.1448		

Note. Type 3 Sums of Squares

[10]

Between Subjects Effects

	Sum of Squares	df	Mean Square	F	p
Base	1.98	2	0.989	5.22	0.009
Amendment	6.96	7	0.995	5.25	< .001
Base ✻ Amendment	14.80	14	1.057	5.58	< .001
Residual	8.90	47	0.189		

Note. Type 3 Sums of Squares

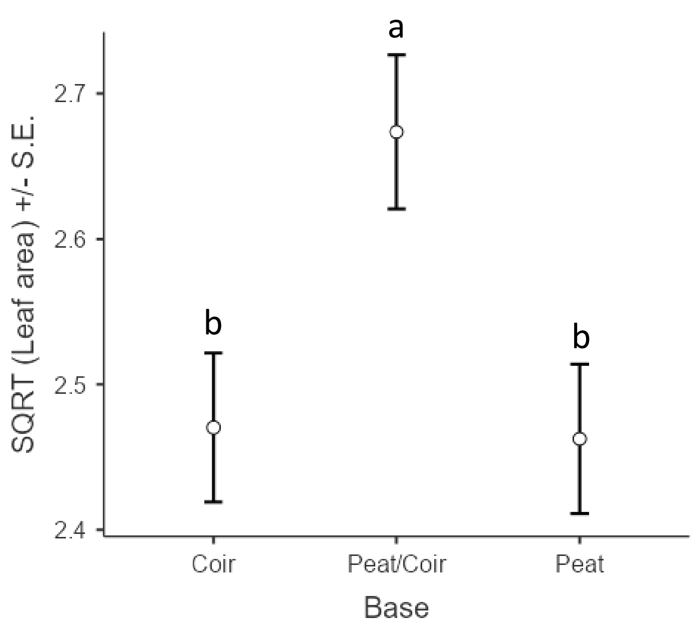

Figure 6. Kale leaf area by growing medium base. Each mean represents three replicates on three sampling dates. Error bars denote standard error. Data were originally in cm^2 but were transformed by square root to reduce heterogeneity of variance. Means labelled with the same letter do not differ significantly (Tukey's test, $\alpha = 0.05$).

Kale grew well in peat-based media without any amendment and in peat-based media amended with wool (Fig. 7). Kale grew slowly in coir-based media without any amendment but performed better in coir-based media amended with biochar and wool, or biochar and wollastonite (Fig. 7). Kale grew well in media based on a blend of peat and coir without any amendment, and with amendments of biochar and wollastonite (Fig. 7).

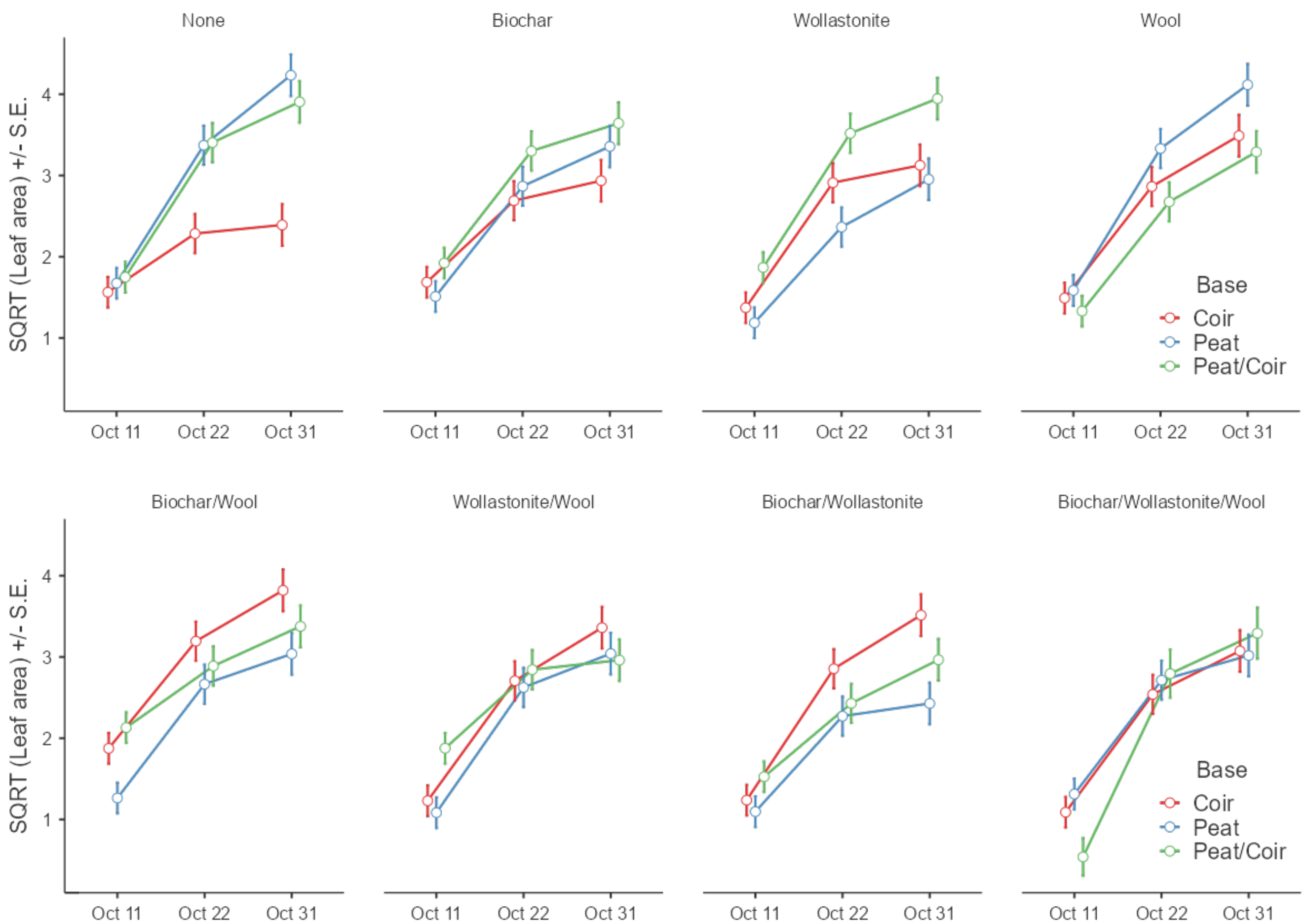

Figure 7. Interactions between date, base, and amendment effects on leaf area of kale. Sampling dates are shown on the x-axis of each sub-figure. Amendment is shown above each sub-figure. Media were based on coir (red lines), peat (blue lines), or a blend of coir and peat (green lines). Leaf areas (cm^2) were transformed by square root to reduce heterogeneity of variance. Error bars denote standard errors.

Principal component analysis suggests that leaf area was strongly correlated with dry weight of shoots, but less so with dry weight of roots (Fig. 8). Kale grown in blends of peat and coir tended to have greater leaf area and dry weight. Kale leaf area and dry weight tended to be inversely correlated with wollastonite concentration. Kale root:shoot ratio was positively correlated with biochar concentration but negatively correlated with wool concentration. Growing media without any amendment tended to have greater root growth (Fig. 8).

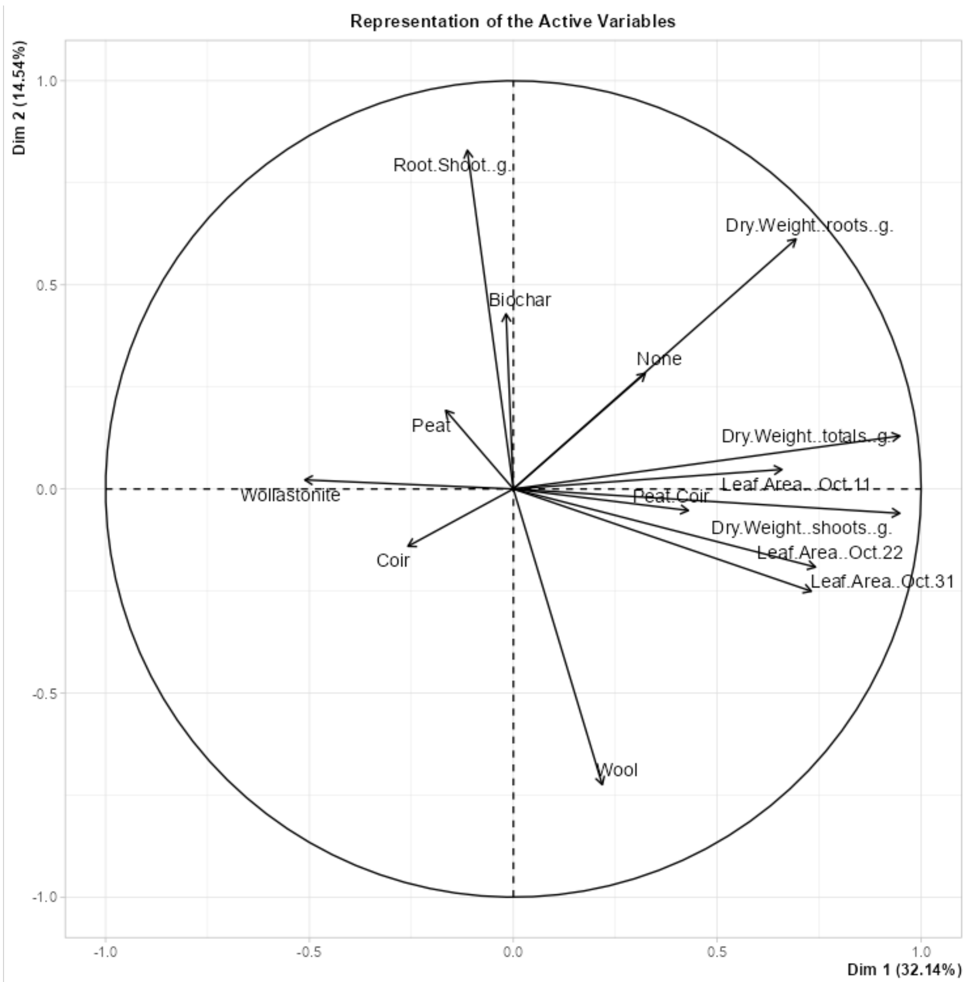

Figure 9. Principal component analysis of kale seedling growth with different growing media and amendments. The two axes displayed explain 47% of the variance. Variables include the proportion of peat or coir in the growing medium; the amount of biochar, wollastonite, or wool, added to the medium; the dry weight of kale roots and shoots; the root:shoot ratio; and kale leaf area on three sampling dates.

5. Discussion

This study evaluated the potential of coconut coir and vermicompost as growing media alternatives to peat and examined how amendments like biochar, wool pellets, and wollastonite affected kale seedling growth. While peat has long been a staple in potting soils, its environmental impact makes finding alternatives crucial. The results of this research show promise for more sustainable growing media but also reveal challenges in replicating the performance of peat-based systems.

5.1 Root:Shoot Ratio

The root:shoot ratio was significantly influenced by soil amendments. Media amended with biochar, or a combination of biochar and wollastonite resulted in higher root:shoot ratios compared to those amended with wool pellets. This suggests biochar may support root development by improving soil aeration and water retention, while the slow-release nitrogen from wool pellets may prioritize shoot growth over roots. These findings highlight that biochar, particularly when combined with wollastonite, could be beneficial for promoting balanced root development in kale seedlings.

5.2 Total Dry Weight

Dry weight results showed that both the base growing media and amendments impacted kale growth, with an interaction between these factors. Peat and coir blends resulted in high total dry weights compared to pure peat or pure coir, indicating a complementary effect when the two materials are combined. Unamended peat and peat-coir blends produced the highest dry weights overall, but some amended treatments, like peat-coir blends with biochar or wollastonite, also performed well. These results suggest that while amendments may not always enhance growth, their benefits depend on the base media composition and how well they complement its properties.

5.3 Leaf Area Measurements

Leaf area increased over time, with media based on peat-coir blends producing larger leaves compared to pure peat or pure coir. Biochar and combinations of biochar and wollastonite were among the most effective amendments for promoting leaf growth, likely due to their ability to improve water retention and nutrient availability. In coir-based media, wool pellets performed well when combined with biochar, but their impact was less pronounced when used with peat. This indicates that the interaction between the base media and amendment plays a key role in plant growth outcomes.

5.4 Implications for Sustainable Agriculture

The findings suggest that peat-coir blends have strong potential as an alternative to pure peat-based growing media. Coconut coir offers similar physical and chemical properties to peat and, when combined with peat, can match or exceed its performance in supporting kale growth. Additionally, biochar and wollastonite stood out as promising amendments due to their ability to enhance root growth.

Wool pellets showed mixed results, performing well in specific combinations but less consistently overall. Their ability to release nitrogen slowly makes them a potential alternative to synthetic fertilizers, but their interactions with different base media require further exploration to maximize their benefits.

5.5 Limitations and Future Research

This study faced several limitations. Data from the first trial were excluded due to poor germination caused by a heat wave and slug damage, which reduced sample viability. Future research should aim to replicate this experiment under more controlled conditions to reduce environmental stressors and to test vermicompost as a growing medium further. Additionally, long-term studies are needed to evaluate nutrient availability, leaching, and microbial activity over multiple growth cycles.

While the peat-coir blend combined with biochar or wollastonite showed potential, more research is necessary to optimize growing media formulations. This includes testing different amendment rates and combinations to ensure consistent performance across various crops and growing conditions.

Overall, this research highlights the potential to replace or reduce peat use in growing media by incorporating coconut coir and sustainable amendments. These findings support efforts to reduce the environmental impact of horticulture and contribute to the development of more sustainable agricultural practices.

6. Conclusion

In conclusion, kale seedlings grew best in media based on a blend of coconut coir and peat. None of the tested amendments increased the growth of kale seedlings; however, biochar and wollastonite amendments did not reduce growth in the peat-coir blend. Therefore, peat can be partially, but not entirely, replaced with coconut coir in growing media without reducing growth.

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