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Effects of Vermicast and Cowdung on the Growth of Groundnut (*Arachis hypogaea* L.*)* and Soybean (*Glycine max* L.)

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ABSTRACT

Two essential legumes with both nutritional and financial advantages are groundnut (*Arachis hypogaea*) and soybean (*Glycine max*). Because organic fertilizers like vermicast and cow dung improve soil fertility, nutrient availability, and microbial activity, they can increase their growth and production. By comparing the impacts of different organic manures on groundnut and soybean growth performance, this study seeks to increase crop yield and offer insights into sustainable agriculture methods. The effects of organic fertilizers on the growth performance and physiology of *Arachis hypogaea* and *Glycine max* were investigated. This study used cow dung, vermicast, and a combination of cow dung and vermicast at three different concentrations: 45 g, 90 g, and 135 g. The following quantitative characteristics were measured: plant height, leaf area, leaf length, leaf breadth, leaf number, and branch number. Both species' fresh and dry weights as well as their levels of carotenoid and chlorophyll were measured. Based on the observed quantitative characteristics, the study found that the effect of three organic fertilizer treatments on *Glycine max* growth increases with increasing fertilizer concentration. Of the three treatments, the application of 135 g was the most effective (69.50 ± 41.72^{a}), while 45 g was the lowest (0.96 ± 0.30^{abc}). Except for cow dung, where the 45 g (36.00 ± 0.00^{a}) had the highest effect on *Arachis hypogaea* growth performance and the 90 g treatment had the least, the same pattern was noted. Vermicast is the least effective, while the combination of cow dung and vermicast is the most successful for both *Glycine max* and *Arachis hypogaea.* The combination of vermicast and cow dung is more beneficial for *Glycine max*, although vermicast has the greatest effect on *Arachis hypogaea*'s chlorophyll A and B, total chlorophyll, and carotene concentration. The most beneficial effect on the fresh (20.78 ± 0.78^{a}) and dry weight (4.16 ± 0.16^{a}) of both plant species was found in cow dung. Therefore, compared to vermicast, cow dung, and the mixture are typically more successful at promoting plant development.

Keywords: *Glycine max*, *Arachis hypogaea*, vermicast, cow dung, vermicast + cow dung.

INTRODUCTION

Composting earthworms are used to create vermicast, also known as vermicompost, an organic and natural fertilizer (Aderounmu and Ogunwande, 2019). When earthworms consume organic matter, they break it down and ground it into a finely divided peat-like substance with a high porosity, aeration, and water-holding ability. This technique speeds up the rate of breakdown and increases microbial activity. This results in the humification effect, which oxidizes and sterilizes unstable organic matter or decomposing plant and animal debris. Vermicast improves soil quality and helps guarantee that plants g*et* the nutrients they require for healthy growth. These nutrients include calcium, magnesium, soluble potassium, exchangeable phosphorus, and nitrate (Aderounmu and Ogunwande, 2019).

Herbivorous bovine animals defecate the undigested residue of their food consumption, which is known as cow dung. Lignin, cellulose, and hemicelluloses make up the majority of this 3:1 mixture of urine and faeces. Along with trace amounts of sulphur, iron, magnesium, copper, cobalt, manganese, and potassium, it also contains 24 other minerals. In addition, certain native Indian cows have higher levels of copper, zinc, phosphorus, and calcium than crossbred cows. Numerous bacterial genera, including *Citrobacter koseri, Enterobacter aerogenes, Escherichia coli, Klebsiella oxytoca, Klebsiella pneumoniae, Kluyvera spp., Morgarella morganii, Pasteurella spp., Providencia alcaligenes, Providencia stuartii,* and *Pseudomonas spp.*, have been isolated from cow dung, which is also home to a rich microbial diversity (Aderounmu and Ogunwande, 2019).

Chauhan and Joshi (2010) found that vermicomposted soil had a significant increase in nitrogen. The vermicast's nitrogen may have contributed to the soil's increased N2 level by causing nitrogen mineralization, facilitated by soil bacteria through the breakdown of earthworm tissues. Pathogen removal from wastes such as cow dung and wastewater treatment plant sludge can be used to enhance soil, which is crucial for

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stopping the development and transmission of illness (Karimi *et al*., 2017). The worms and vermicompost helped the vegetable crops grow, bloom, and yield more abundantly. Plants treated with worms and vermicompost had lower rates of "yellow vein mosaic," "colour rot," and "powdery mildew" diseases. The impact of applying EM and cattle manure on groundnut (*Arachis hypogaea* L.) yield and yield components was investigated by Thayamani and Suthamathy (2016). According to their research, adding more cattle dung (up to 15 t/ha) along with EM enhanced the number of pods, the weight of the pods and kernels per plant, the weight of the 100 kernels, the shelling percentage, and the overall yield.

Musa and Singh (2015) investigated the effects of cow dung application on the yield and yield components of two groundnut (*Arachis hypogaea* L.) varieties in Sokoto, Nigeria's Semi-arid Zone. Their treatments included a factorial combination of two groundnut varieties (Ex-Dakar and RMP-12) and three levels of cow dung (0, 15, and 30 t ha^{-1}), for six treatment combinations. The treatments were set up in a randomized complete block design replicated three times. The results showed that the Ex-Dakar variety outperformed RMP-12 in every parameter measured (number of pods $plant^{-1}$, pod yield, and grain yield). Applying cow dung improved the crop's grain yield, pod yield, and number of pods per plant. It worked best at a rate of 15 t ha^{-1}. East Asian legumes like soybeans are grown for their edible beans, which have a variety of uses. It has a connection to peanuts, peas, and alfalfa. Because of their versatility, soyas can be cultivated in a variety of soil types and climates. They have many forms appropriate for different regions and can grow up to 1.5 meters in height (Singh, 2011).

According to Hinton *et al*. (2018), eating soy products (soy milk) and soybean protein that contains the flavonoid genistein, Biochanin A, and phytoestrogens (isoflavones) may reduce your risk of developing several cancers, such as breast, prostate (Ma *et al*., 2008), endometrial, lung (Sedaghat *et al*., 2019), colon, liver, and bladder cancers. According to Reverri *et al*. (2015), soy proteins and peptides have demonstrated promise in halting the initiation, development, and advancement of cancer. The study aims to examine the effects and impacts of vermicast and cow dung on the performance of *Arachis hypogaea* (groundnut) and *Glycine max* (soybean).

MATERIALS AND METHODS

Study Area

Laboratory work was done at the University of Ilorin's central research laboratory, while the potting experiment was conducted at the Botanical Garden situated at Latitude 8 degrees 47 minutes N, 8^0 47^1 and Longitude 4 degrees 66 minutes E, 4^0 66^1 with 290 meters altitude of the university, which is situated in Ilorin, which is in Nigeria's Southern Guinea Savanna ecological zone.

Determination of Chlorophyll Concentration

For the Spectrophotometer/Colorimeter, a clean cuvette was acquired and filled two-thirds of the way with 80% acetone; this served as the blank. After wiping the cuvette with a tissue, it was placed inside the spectrophotometer and the wavelength was adjusted to 663 nm. The spectrophotometer was set to 0 absorbance with the blank in place, and the cuvette chamber was covered. For the subsequent measurement, the blank was taken out and stored. After gently swirling the initial extract in the test tube, a second cuvette was filled two-thirds of the way. After cleaning it, it was placed into the Spectrophotometer and the hatch was shut. The A663, or absorbance at 663 nm, should be shown in the readout. After noting this figure, step 2 was carried out with the remaining extracts. The wavelength was adjusted to 645 nm. The spectrophotometer re-zeroed at the new wavelength after the blank cuvette was put back in. The blank was taken out and placed in a cuvette with the initial extract. The recorded reading was A645. For the remaining extracts, this was done again.

Calculations:

Using Arnon's formula (below), absorbance values are converted to mg Chl g-1 leaf tissue.

Chl a (mg g-1) = [(12.7 × A663) - (2.6 × A645)] × ml acetone / mg leaf tissue

Chl b (mg g-1) = [(22.9 × A645) - (4.68 × A663)] × ml acetone / mg leaf tissue

Total Chl = 20.3A645 + 8.02A663

C x+c = 1000 A470 – 1.90Chla – 63.14 Chlb/214, (x = xanthophylls and carotenes) as suggested by Makeen *et al.* (2007).

Experimental Design

Vermicast at 2.5%, 5%, and 7.5% equivalent to 45 g, 90 g, and 135 g, cow dung at 2.5%, 5%, and 7.5% equivalent to 45 g, 90 g, and 135 g, a combination of vermicast and cow dung at 1.25% and 1.25%, 2.5% and 2.5%, 3.75% and 3.75% equivalent to 45 g, 90 g, and 135 g of each treatment, and control were all administered to each plant in two replicates. The field trial was designed with a completely randomized design (CRD) and included 40 treatments. The cow dung was gathered, let to air dry, then pulverized into a powder and immediately mixed into the soil. The vermicast was also applied directly to the soil and well-mixed. Both treatments were mixed before being directly administered to the soil. After the soil (1800 g) containing each treatment was transferred into each

pot and 400 ml of water was added as the initial water volume, the seedlings were planted in the soil.

Data Collection

Measurements of parameters were taken at One week after planting (1 WAP), two weeks after planting (2 WAP), three weeks after planting (3WAP), four weeks after planting (4WAP), and five weeks after planting (5WAP). The data collected were: Plant height (cm) using measuring tape, number of leaves, leaf length and breadth, leaf area, Fresh weight and Dry weight, and Chlorophyll and Carotene

Data Analysis

The data obtained were subjected to a one-way Analysis of Variance (ANOVA) and the means were separated using the Duncan Multiple Range Test (DMRT).

RESULTS AND DISCUSSION

Effects of Vermicast and Cow Dung on *Glycine max* (soybean) at 1WAP

The leaf numbers for all treatments and the control group do not differ substantially, according to Table 1's results of the effects of Vmst and CD on *Glycine max* (soybean) at 1WAP. There is no discernible difference in the branch numbers (3.50 ± 0.71^{ab}, 3.50 ± 0.71^{ab}, 3.00 ± 0.00^{b}, 3.50 ± 0.71^{ab}, 3.50 ± 2.12^{ab}, 5.50 ± 0.71^{a}, 3.50 ± 0.71^{ab}, 3.00 ± 1.41^{b}, 4.00 ± 0.00^{ab}) for all treatment and control (3.50 ± 0.71^{ab}). There is no discernible difference in plant height between the control and any treatments. There is no discernible difference in leaf length between the control and any treatments. There is no discernible difference in the leaf breadth between the control and the treatments. There is no discernible difference in the leaf area between the control and the treatments. This study supports that of Mathivanan *et al*. (2012), who found that applying 200 g of vermicompost to agricultural plants enhanced their fresh weight and dry weight in comparison to the control and other treatments.

Table 1: Effects of Vermicast and Cow Dung on *Glycine max* (soybean) at 1WAP

Treatments	Number of Leaves	Number of Branches	Plant Height (cm)	Leaf Length (cm)	Leaf Breadth (cm)	Leaf Area (cm^2)
Control	12.50 ± 2.12^{ab}	3.50 ± 0.71^{ab}	20.60 ± 7.35^{a}	4.75 ± 2.76^{a}	3.20 ± 1.56^{a}	13.00 ± 12.16^{a}
Vmst 45g	12.00 ± 1.41^{ab}	3.50 ± 0.71^{ab}	17.90 ± 0.14^{a}	4.10 ± 0.42^{a}	3.10 ± 0.14^{a}	9.56 ± 1.42^{a}
Vmst 90g	11.50 ± 0.71^{ab}	3.50 ± 0.71^{ab}	16.10 ± 5.51^{a}	4.95 ± 0.71^{a}	3.40 ± 0.14^{a}	16.00 ± 5.48^{a}
Vmst135g	11.00 ± 0.00^{ab}	3.00 ± 0.00^{b}	19.30 ± 1.13^{a}	5.05 ± 0.78^{a}	3.70 ± 0.42^{a}	14.13 ± 3.77^{a}
Vmst+CD45g	12.50 ± 2.12^{ab}	3.50 ± 0.71^{ab}	23.90 ± 2.55^{a}	5.95 ± 0.64^{a}	4.15 ± 0.64^{a}	18.67 ± 4.82^{a}
Vmst+CD 90g	10.00 ± 7.07^{ab}	3.50 ± 2.12^{ab}	15.95 ± 5.59^{a}	4.05 ± 1.63^{a}	3.05 ± 1.06^{a}	9.91 ± 6.94^{a}
Vmst+CD135g	17.50 ± 2.12^{a}	5.50 ± 0.71^{a}	23.50 ± 0.71^{a}	6.30 ± 1.41^{a}	4.30 ± 0.85^{a}	20.77 ± 8.57^{a}
CD 45g	11.50 ± 0.71^{ab}	3.50 ± 0.71^{ab}	15.15 ± 0.78^{a}	4.15 ± 0.71^{a}	2.80 ± 0.14^{a}	8.72 ± 0.59^{a}
CD 90g	11.00 ± 4.24^{ab}	3.00 ± 1.41^{b}	18.95 ± 1.77^{a}	4.85 ± 0.78^{a}	3.50 ± 0.42^{a}	12.86 ± 3.59^{a}
CD 135g	13.50 ± 0.71^{ab}	4.00 ± 0.00^{ab}	22.90 ± 3.11^{a}	5.90 ± 0.42^{a}	4.25 ± 0.21^{a}	18.84 ± 2.29^{a}

Values represent mean ± SD. Values with the same letter are not significantly different at $p\leq0.05$. Vmst = Vermicast; Vmst + CD =Vermicast plus Cow dung; CD = Cow dung.

Effects of Vermicast and Cow Dung on *Glycine max (soybean)* at 2WAP

Table 2 shows the outcome of the interaction between Vmst and CD on *Glycine max* (soybean) at 2WAP. The vermicast+cow dung treatments had the highest values for the parameters that were tested (22.00 ± 8.49^{a}, 7.00 ± 2.83^{a}, 26.20 ± 0.99^{ab}, 6.40 ± 1.41^{a}, 4.40 ± 0.85^{a}, 21.57 ± 8.74^{a}), but they were not statistically different from the other treatments ($p\leq0.05$). This outcome is consistent with the findings of Govindapillai *et al*. (2018), who investigated how vermicompost and plant growth enhancers affected the exo-morphological characteristics of *Capsicum annum* (Linn.) Hepper. The growth parameters that were measured included the length of the internode, shoot, and the number of leaves and branches.

Table 2: Effects of Vermicast and Cow Dung on *Glycine max (soybean)* at 2WAP

Treatments	Number of Leaves	Number of Branches	Plant height (cm)	Leaf Length (cm)	Leaf Breadth (cm)	Leaf Area (cm^2)
Control	14.50 ± 3.54^{a}	4.50 ± 0.71^{a}	24.65 ± 6.43^{ab}	4.80 ± 2.69^{a}	3.50 ± 1.98^{a}	14.60 ± 14.18^{a}
Vmst 45g	14.50 ± 0.71^{a}	4.50 ± 0.71^{a}	22.55 ± 0.92^{ab}	5.15 ± 1.91^{a}	3.80 ± 0.99^{a}	15.39 ± 9.26^{a}
Vmst 90g	14.00 ± 4.24^{a}	4.50 ± 2.12^{a}	18.75 ± 3.46^{b}	5.30 ± 0.28^{a}	3.70 ± 0.28^{a}	14.71 ± 1.91^{a}
Vmst 135g	15.50 ± 2.12^{a}	4.50 ± 0.71^{a}	23.45 ± 0.71^{ab}	5.90 ± 0.14^{a}	4.30 ± 0.28^{a}	19.04 ± 1.71^{a}
Vmst+CD 45g	15.00 ± 2.83^{a}	4.00 ± 1.41^{a}	25.85 ± 3.32^{ab}	6.05 ± 0.64^{a}	4.10 ± 0.57^{a}	18.74 ± 4.52^{a}
Vmst+CD 90g	13.50 ± 6.36^{a}	4.50 ± 2.12^{a}	20.80 ± 4.81^{ab}	4.85 ± 0.64^{a}	3.65 ± 0.35^{a}	13.36 ± 3.03^{a}
Vmst+CD135g	22.00 ± 8.49^{a}	7.00 ± 2.83^{a}	26.20 ± 0.99^{ab}	6.40 ± 1.41^{a}	4.40 ± 0.85^{a}	21.57 ± 8.74^{a}
CD 45g	14.50 ± 0.71^{a}	4.50 ± 0.71^{a}	20.90 ± 1.56^{ab}	4.90 ± 0.99^{a}	3.35 ± 0.64^{a}	12.55 ± 4.83^{a}
CD 90g	14.50 ± 4.95^{a}	4.00 ± 1.41^{a}	24.20 ± 1.41^{ab}	5.80 ± 0.42^{a}	4.25 ± 0.21^{a}	18.52 ± 2.28^{a}
CD 135g	18.00 ± 2.83^{a}	5.50 ± 0.71^{a}	26.95 ± 1.77^{a}	6.80 ± 0.99^{a}	5.00 ± 0.42^{a}	25.66 ± 5.88^{a}

Values represent mean ± SD. Values with the same letter are not significantly different at $p\leq0.05$. Vmst = Vermicast; Vmst + CD =Vermicast plus Cow dung; CD = Cow dung

Effects of Vermicast and Cow Dung on *Glycine max* (soybean) at 3WAP

The effect of Vmst and CD on *Glycine max* (soybean) at 3WAP shows that there is no significant difference in the number of leaves between the treatments. There is no significant difference in the branch numbers for all treatments and controls. There is no significant difference in the number of branches and plant height between the control and any treatments. There is no significant difference in leaf length between the control and any treatments. There is no significant difference in the leaf breadth between the control and the treatments. There is no significant difference in the number of branches leaf area between the control and the treatments. This study is consistent with one conducted by Anand and Gupta (2018), which focused on how treating the soil with vermicompost raises the amounts of micronutrients.

Table 3: Effects of Vermicast and Cow Dung on *Glycine max* (soybean) at 3WAP

Treatments	Number of Leaves	Number of Branches	Plant Height (cm)	Leaf Length (cm)	Leaf Breadth (cm)	Leaf Area (cm^2)
Control	15.50±4.95[a]	5.00±1.41[a]	27.70±6.79[ab]	4.80±2.69[a]	3.50±1.98[a]	14.60±14.18[a]
Vmst 45g	14.50±0.71[a]	4.50±0.71[a]	25.10±2.12[ab]	5.40±2.26[a]	4.00±1.27[a]	17.28±11.94[a]
Vmst 90g	17.50±4.95[a]	5.50±2.12[a]	20.95±1.48[b]	6.15±1.34[a]	4.05±0.64[a]	19.00±7.02[a]
Vmst 135g	17.00±0.00[a]	5.00±0.00[a]	25.85±0.64[ab]	6.10±0.28[a]	4.55±0.49[a]	20.87±3.23[a]
Vmst+CD 45g	17.00±2.83[a]	5.00±1.41[a]	29.80±2.26[ab]	6.05±0.64[a]	4.30±0.71[a]	19.68±5.26[a]
Vmst+CD 90g	16.00±7.07[a]	5.50±2.12[a]	22.95±5.02[ab]	4.90±0.57[a]	3.75±0.35[a]	13.86±2.89[a]
Vmst+CD135g	24.50±7.78[a]	8.00±2.83[a]	30.10±5.52[ab]	6.50±1.41[a]	4.45±0.78[a]	18.61±3.56[a]
CD 45g	17.00±0.00[a]	5.50±0.71[a]	25.65±1.91[ab]	5.05±1.06[a]	3.40±0.57[a]	13.10±4.85[a]
CD 90g	16.00±5.66[a]	5.50±2.12[a]	26.85±2.33[ab]	5.90±0.57[a]	4.40±0.28[a]	19.53±3.12[a]
CD 135g	19.50±3.53[a]	6.50±0.71[a]	30.50±4.24[a]	6.80±0.99[a]	5.10±0.42[a]	26.17±5.95[a]

Values represent mean ± SD. Values with the same letter are not significantly different at $p \leq 0.05$. Vmst = Vermicast; Vmst + CD =Vermicast plus Cow dung; CD = Cow dung.

Effects of Vermicast and Cow Dung on *Glycine max* (soybean) at 4WAP

As shown in Table 4, the effect of Vmst and CD on *Glycine max* (soybean) at 4WAP shows that there is no significant difference in the number of leaves. There is no discernible difference in the branch number in all the treatments. There is little variation in plant height between the control and all treatment groups. All treatments and the control group's leaf lengths are not appreciably different. There is no discernible difference in the leaf breadth for treatments and the control. There is no discernible difference in the leaf area for all treatments and the control. The combination of vermicompost's high water-holding capacity, maximal nutrient (NPK) concentrations, and microbial activity promotes plant development and increased output. The growth of *Glycine max* and *Arachis hypogaea* was aided by the remarkable biological and physicochemical parameters of vermicompost amended soil, according to Soobhany *et al*. (2017) and Zhu *et al*. (2017). These parameters included increased porosity, aeration, nutrients, and organic matter, as well as significant pH, temperature, moisture contents, and conductivity of the soil.

Table 4: Effects of Vermicast and Cow Dung on *Glycine max* (soybean) at 4WAP

Treatments	Number of Leaves	Number of Branches	Plant Height (cm)	Leaf Length (cm)	Leaf Breadth (cm)	Leaf Area (cm^2)
Control	18.00±4.24[a]	6.00±1.41[a]	31.05±8.27[ab]	4.95±2.76[a]	3.60±2.12[a]	15.56±15.32[a]
Vmst 45g	18.00±4.24[a]	6.00±1.41[a]	27.20±3.82[ab]	5.60±2.55[a]	4.20±1.56[a]	19.13±14.55[a]
Vmst 90g	19.00±5.66[a]	6.50±2.12[a]	23.30±0.28[b]	7.30±2.69[a]	4.35±0.92[a]	24.74±13.80[a]
Vmst 135g	18.00±0.00[a]	6.00±0.00[a]	28.35±1.77[ab]	6.35±0.49[a]	4.80±0.71[a]	22.99±5.15[a]
Vmst+CD 45g	19.50±2.12[a]	6.50±0.71[a]	34.35±4.03[a]	6.10±0.57[a]	4.45±0.78[a]	20.52±5.45[a]
Vmst+CD 90g	19.50±6.36[a]	6.50±2.12[a]	25.00±4.67[ab]	5.00±0.57[a]	3.85±0.35[a]	14.51±2.96[a]
Vmst+CD135g	27.00±8.49[a]	9.00±2.83[a]	33.30±5.94[ab]	6.60±1.41[a]	4.55±0.78[a]	22.94±8.68[a]
CD 45g	19.00±1.41[a]	6.50±0.71[a]	28.10±2.97[ab]	5.50±1.56[a]	3.45±0.49[a]	14.52±6.07[a]
CD 90g	19.50±6.36[a]	6.50±2.12[a]	27.60±2.12[ab]	6.10±0.71[a]	4.60±0.42[a]	21.16±4.38[a]
CD 135g	22.00±2.83[a]	7.50±0.71[a]	33.95±4.88[ab]	6.90±0.99[a]	5.20±0.42[a]	27.07±6.06[a]

Values represent mean ± SD. Values with the same letter are not significantly different at $p \leq 0.05$. Vmst = Vermicast; Vmst + CD =Vermicast plus Cow dung; CD = Cow dung.

Effects of Vermicast and Cow Dung on *Glycine max* (soybean) at 5WAP

As shown in Table 5, the effect of Vmst and CD on *Glycine max* (soybean) at 5WAP shows that there is no significant difference in the number of leaves for either of the treatments and the control. For all treatment and control, there is no discernible difference in the branch number. There is little variation in plant height between the control and all treatment groups. All treatments and the control group's leaf lengths are not appreciably different. There is no discernible difference in the leaf breadth for any treatments and the control. There is no discernible difference in the leaf area (19.13±14.55[a], 27.50±17.70[a], 22.99±5.15[a], 20.52±5.45[a], 14.51±2.96[a] 22.94±8.68[a] 13.67±4.86[a] 21.16±4.38[a] 27.07±6.06[a]) for all treatments and the control 15.56±15.32[a].

The results of this study are in line with those of Ansari and Sukhraj (2010), who looked at how plants can absorb available nutrients by releasing them gradually into the soil due to the carbon content in vermicomposted soil. In contrast to the control and other treatments, the vermicompost treatment significantly enhanced the seedling and growth characteristics, according to the study's findings. The results of Gichaba *et al*. (2020), and Lazcano *et al*. (2010) are in agreement with these findings.

Table 5: Effects of Vermicast and Cow Dung on *Glycine max* (soybean) at 5WAP

Treatments	Leaf Number (cm)	Branch Number (cm)	Plant Height (cm)	Leaf Length (cm)	Leaf Breadth (cm)	Leaf Area (cm^2)
Control	21.00±4.24[a]	7.00±1.41[a]	33.85±8.70[ab]	4.95±2.76[a]	3.60±2.12[a]	15.56±15.32[a]
Vmst 45g	21.00±4.24[a]	7.00±1.41[a]	30.85±3.75[ab]	5.60±2.55[a]	4.20±1.56[a]	19.13±14.55[a]
Vmst 90g	23.00±7.07[a]	7.50±2.12[a]	26.05±1.48[b]	7.55±3.04[a]	4.60±1.27[a]	27.50±17.70[a]
Vmst 135g	21.00±0.00[a]	7.00±0.00[a]	32.55±3.32[ab]	6.35±0.49[a]	4.80±0.71[a]	22.99±5.15[a]
Vmst+CD 45g	22.50±2.12[a]	7.50±0.71[a]	37.25±3.18[ab]	6.10±0.57[a]	4.45±0.78[a]	20.52±5.45[a]
Vmst+CD 90g	22.50±6.36[a]	7.50±2.12[a]	29.70±3.68[ab]	5.00±0.57[a]	3.85±0.35[a]	14.51±2.96[a]
Vmst+CD135g	30.00±8.49[a]	10.00±2.83[a]	37.30±3.96[a]	6.60±1.41[a]	4.55±0.78[a]	22.94±8.68[a]
CD 45g	22.00±1.41[a]	7.50±0.71[a]	32.70±4.53[ab]	5.20±1.13[a]	3.45±0.49[a]	13.67±4.86[a]
CD 90g	22.50±6.36[a]	7.50±2.12[a]	33.35±4.03[ab]	6.10±0.71[a]	4.60±0.42[a]	21.16±4.38[a]
CD 135g	25.00±2.83[a]	8.50±0.71[a]	37.05±4.45[ab]	6.90±0.99[a]	5.20±0.42[a]	27.07±6.06[a]

Values represent mean ± SD. Values with the same letter are not significantly different at $p \leq 0.05$. Vmst = Vermicast; Vmst + CD =Vermicast plus Cow dung; CD = Cow dung

Effects of Vermicast and Cow Dung on *Arachis hypogaea* (Groundnut) at 1WAP

The results of the effects of Vmst and CD on *Arachis hypogaea* (Groundnut) at 1WAP, presented in Table 6, show that leaf and branch numbers across all treatments and the control are not significantly different. For plant height, the control group had the highest measurement, while Vmst at 45g, 135g, and CD at 90g showed no significant differences. The lowest heights were noted in Vmst + CD at 90g and CD at 135g, which were also not significantly different. In terms of leaf length, the control had the highest length, but it was not significantly different from several treatments, including CD at 45g and Vmst at 45g. The lowest leaf length was in CD at 135g, which showed no significant difference from several other treatments. Regarding leaf breadth, the control exhibited the highest measurement, with no significant differences among the various treatments. Similarly, for leaf area, the control had the largest area, but it was not significantly different from other treatments, except for Vmst + CD at 90g, which had the smallest area. These findings align with Singh *et al.* (2011), who noted that favourable conditions in vermicompost, including optimal temperature and moisture, significantly contribute to enhanced plant growth.

Mathivanan *et al.* (2012) investigated how groundnut (*Arachis hypogaea* L.) growth and yield were affected by vermicompost, also known as vermicast. To investigate the effects of the applied vermicompost on groundnut development and yield, they utilized 10 kg of soil devoid of vermicompost (as a control) and 10 kg of soil with different amounts (mass) of vermicompost (100g, 150g, 200g, and 250g). While the number of seeds per plant and the weight of 100 seeds (g/seed) were the yield criteria, the growth

characteristics examined were root length, shoot length, nodulation, fresh weight, and dry weight.

When comparing control and other treatments, the 200 g application of vermicompost produced the greatest groundnut root and shoot growth in the field experiment by Mathivanan *et al*. (2012). Comparing 200 g of vermicompost application to control and other treatments, the maximum number of groundnut nodules was also noted (Mathivanan *et al*., 2012).

Table 6: Effects of Vermicast and Cow Dung on *Arachis hypogaea* (Groundnut) at 1WAP

Treatments	Leaf Number (cm)	Branch Number (cm)	Plant Height (cm)	Leaf Length (cm)	Leaf Branch (cm)	Leaf Area (cm^2)
Control	27.00±0.00^{a}	7.00±0.00^{a}	11.75±0.71^{a}	2.90±0.28^{a}	2.10±0.00^{a}	4.57±0.45^{a}
Vmst 45g	25.50±9.19^{a}	6.50±2.12^{a}	9.85±0.35^{b}	2.30±0.14^{b}	1.60±0.14^{b}	2.77±0.41^{bc}
Vmst 90g	22.00±2.83^{a}	5.50±0.71^{a}	8.10±0.71^{de}	2.05±0.21^{bc}	1.45±0.71^{bc}	2.24±0.34^{bc}
Vmst 135g	27.50±0.71^{a}	7.00±0.00^{a}	9.50±0.14^{bc}	2.20±0.28^{bc}	1.55±0.21^{bc}	2.58±0.68^{bc}
Vmst+CD 45g	23.50±4.95^{a}	6.00±1.41^{a}	7.95±0.21^{e}	2.05±0.71^{bc}	1.45±0.71^{bc}	2.23±0.19^{bc}
Vmst+CD 90g	20.00±5.66^{a}	5.00±1.41^{a}	5.95±0.35^{f}	2.10±0.14^{bc}	1.15±0.71^{d}	1.81±0.01^{c}
Vmst+CD135g	25.50±7.78^{a}	6.50±2.12^{a}	8.70±0.14^{de}	2.30±0.00^{b}	1.70±0.00^{b}	2.93±0.00^{b}
CD 45g	26.00±2.83^{a}	6.50±0.71^{a}	8.80±0.14^{cd}	2.50±0.28^{ab}	1.65±0.21^{b}	3.12±0.75^{b}
CD 90g	22.00±8.49^{a}	5.50±2.12^{a}	9.75±0.21^{b}	2.35±0.71^{b}	1.65±0.71^{b}	2.91±0.21^{b}
CD 135g	18.00±2.83^{a}	4.50±0.71^{a}	6.05±0.49^{f}	1.80±0.14^{c}	1.30±0.14^{cd}	1.76±0.33^{c}

Values represent mean ± SD. Values with the same letter are not significantly different at $p \leq 0.05$. Vmst = Vermicast; Vmst + CD =Vermicast plus Cow dung; CD = Cow dung

Effects of Vermicast and Cow Dung on *Arachis hypogaea* (Groundnut) at 2WAP

Table 7 shows the effects of Vmst and CD on *Arachis hypogea* (groundnut) at 2WAP. It shows that there is no significant difference in the number of leaves between the control and the treatment groups. Compared to the control and other treatments, Vmst 135 g had the largest branch number, according to the branch number that is displayed. The branch with the lowest number is CD 135 g. According to the plant height data, the control group has the tallest plants but does not differ substantially from CD 45 g, Vmst + CD 135 g, or CD 90 g. Vmst 90 g, Vmst + CD 90 g, and CD 135 g are not substantially different from each other. There is little variation in leaf length between the control and the treatments. There is no significant difference in the leaf breadth between the control and the treatments. There is no discernible difference in the leaf area between the control and the treatments. The results of Thayamani and Suthamathy (2016), showed that adding cattle manure (up to 15 t/ha) in conjunction with EM enhanced the number of pods, weight of pods and kernels per plant, 100-kernel weight, shelling percentage, and overall yield, are positively correlated with this.

Table 7: **Effects of Vermicast and Cow Dung on *Arachis hypogaea* (Groundnut) at 2WAP**

Treatments	Leaf Number (cm)	Branch Number (cm)	Plant Height (cm)	Leaf Length (cm)	Leaf Branch (cm)	Leaf Area (cm^2)
Control	35.00±5.66^{ab}	9.00±1.41^{ab}	12.00±0.57^{a}	2.70±0.57^{a}	2.10±0.00^{a}	4.25±0.89^{a}
Vmst 45g	29.50±9.19^{ab}	7.50±2.12^{abc}	10.05±0.35^{b}	2.40±0.14^{ab}	1.70±0.28^{b}	3.08±0.69^{ab}
Vmst 90g	26.00±2.83^{ab}	6.50±0.71^{bc}	8.20±0.28^{cd}	2.10±0.28^{ab}	1.50±0.00^{b}	2.36±0.32^{b}
Vmst 135g	39.00±0.00^{a}	10.00±0.00^{a}	9.65±0.35^{bc}	2.20±0.28^{ab}	1.55±0.21^{b}	2.58±0.68^{b}
Vmst+CD 45g	33.50±7.78^{ab}	8.50±2.12^{abc}	9.40±1.70^{bc}	2.05±0.71^{ab}	1.40±0.14^{b}	2.16±0.30^{b}
Vmst+CD 90g	28.00±5.66^{ab}	7.00±1.41^{abc}	7.60±0.71^{d}	2.35±0.49^{ab}	1.40±0.28^{b}	2.52±1.02^{b}
Vmst+CD135g	35.50±4.95^{a}	9.00±1.41^{ab}	9.75±0.49^{bc}	2.35±0.71^{ab}	1.65±0.71^{b}	2.91±0.04^{ab}
CD 45g	36.00±0.00^{a}	9.00±0.00^{ab}	10.55±0.64^{ab}	2.50±0.28^{ab}	1.60±0.14^{b}	3.02±0.60^{ab}
CD 90g	31.00±5.66^{ab}	8.00±1.41^{abc}	9.75±0.21^{bc}	2.35±0.71^{ab}	1.60±0.00^{b}	2.82±0.08^{b}
CD 135g	22.00±2.83^{b}	5.50±0.71^{c}	7.20±0.00^{d}	1.95±0.71^{b}	1.45±0.71^{b}	2.12±0.03^{b}

Values represent mean ± SD. Values with the same letter are not significantly different at $p \leq 0.05$. Vmst = Vermicast; Vmst + CD =Vermicast plus Cow dung; CD = Cow dung

Effects of Vermicast and Cow Dung on *Arachis hypogaea* (Groundnut) at 3WAP

As shown in Table 8, the results of the effects of Vmst and CD on *Arachis hypogea* (groundnut) at 3WAP show that there is no significant difference in the number of leaves between all treatments and control. There is no discernible difference in the branch numbers for all treatments and controls. There is no significant difference in plant height between the control and any treatments. There is no significant difference in leaf length between the control and any treatments. The leaf breadth presented are grouped into two (2); Group 1: The control has the highest leaf breadth. Group 2: Vmst 45 g, Vmst 90 g, Vmst 135 g, Vmst + CD 45 g, Vmst + CD 90 g, Vmst + CD 135 g, CD 90 g and CD 135 g are not significantly different. The leaf area presented are grouped into two (2); Group 1: The control has the highest leaf area. Group 2: Vmst 45 g, Vmst 90 g, Vmst 135 g, Vmst + CD 45 g, Vmst + CD 90 g, Vmst + CD 135 g, CD 45 g. CD 90 g and CD 135 g are not significantly different. This result is in line with the study of Yaduvanshi and Sharma (2008), which revealed that root and shoot weights of marigolds were also significantly greater due to vermicompost application

Table 8: Effects of Vermicast and Cow Dung on *Arachis hypogaea* (Groundnut) at 3WAP

Treatments	Leaf Number (cm)	Branch Number (cm)	Plant Height (cm)	Leaf Length (cm)	Leaf Breadth (cm)	Leaf Area (cm^2)
Control	37.00±2.83[a]	9.50±0.71[a]	12.55±0.21[a]	2.90±0.28[a]	2.15±0.71[a]	4.67±0.30[a]
Vmst 45g	31.50±12.02[a]	8.00±2.83[a]	10.45±0.64[ab]	2.40±0.14[ab]	1.70±0.28[b]	3.08±0.69[b]
Vmst 90g	36.00±5.66[a]	9.00±1.41[a]	8.50±0.14[b]	2.10±0.28[b]	1.50±0.00[b]	2.36±0.32[b]
Vmst 135g	43.00±5.66[a]	11.00±1.41[a]	9.70±0.42[ab]	2.25±0.21[b]	1.55±0.21[b]	2.63±0.60[b]
Vmst+CD45g	35.50±4.95[a]	9.00±1.41[a]	10.30±3.25[ab]	2.05±0.71[b]	1.45±0.71[b]	2.23±0.19[b]
Vmst+CD90g	34.00±2.83[a]	8.50±0.71[a]	8.35±1.63[b]	2.40±0.57[ab]	1.50±0.42[b]	2.79±1.40[b]
Vmst+CD135g	45.50±7.78[a]	11.50±2.12[a]	10.15±0.71[ab]	2.35±0.71[ab]	1.65±0.71[b]	2.91±0.04[b]
CD 45g	42.00±2.83[a]	10.50±0.71[a]	11.35±0.64[ab]	2.50±0.28[ab]	1.60±0.14[b]	3.02±0.60[b]
CD 90g	38.00±8.49[a]	9.50±2.12[a]	9.95±0.35[ab]	2.35±0.71[ab]	1.65±0.71[b]	2.91±0.21[b]
CD 135g	33.50±7.78[a]	8.50±2.12[a]	9.00±0.71[b]	2.00±0.00[b]	1.55±0.21[b]	2.33±0.32[b]

Values represent mean ± SD. Values with the same letter are not significantly different at $p \leq 0.05$. Vmst = Vermicast; Vmst + CD =Vermicast plus Cow dung; CD = Cow dung

Effects of Vermicast and Cow Dung on *Arachis hypogaea* (Groundnut) at 4WAP

The findings of this research on the effects of Vmst and CD on *Arachis hypogea* (Groundnut) at 4WAP indicate that there are no significant differences in leaf numbers, branch numbers, plant height, leaf lengths, and leaf breadth among all the treatments and the control group. Regarding leaf area, the results can be categorized into two groups: The control group exhibited the highest leaf area. The treatments, including Vmst at 45g, Vmst at 90g, Vmst at 135g, Vmst combined with CD at 45g, Vmst combined with CD at 90g, Vmst combined with CD at 135g, CD at 90g, and CD at 135g, showed no significant differences among them. These results are consistent with those obtained by Zaman *et al*. (2017), who investigated the effect of cow dung as organic manure on the growth, leaf biomass yield of *Stevia rebaudiana,* and postharvest soil fertility.

Effects of Vermicast and Cow Dung on *Arachis hypogaea* (Groundnut) at 5WAP

The result of the effect of Vmst and CD on *Arachis hypogea* (Groundnut) at 5WAP as presented in Table 10 reveals that the leaf number for all the treatment and control are not significantly different. The branch number for all the treatment and control are not significantly different. The plant height for all the treatment and control are not significantly different. The leaf length for all the treatment and control are not significantly different. The leaf breadth for all the treatment (1.70±0.28[a] 1.50±0.00[a] 1.55±0.21[a] 1.45±0.71[a] 1.65±0.64[a] 1.65±0.07[a] 1.60±0.14[a] 1.65±0.07[a] 1.80±0.57[a]) and control (2.15±0.71[a]) are not significantly different. The leaf area for all the treatment and control are not significantly different.

This result is thus in accordance to the findings of Arancon *et al*. (2008), whose study showed the significant effects of vermicompost on two ornamental plants, (marigolds, and petunias).

Table 9: Effects of Vermicast and Cow Dung on *Arachis hypogaea* (Groundnut) at 4WAP

Treatments	Leaf Number (cm)	Branch Number (cm)	Plant Height (cm)	Leaf Length (cm)	Leaf Breadth (cm)	Leaf Area (cm^2)
Control	53.00±2.83^{ab}	13.50±0.71^{ab}	12.80±0.42^{a}	2.90±0.28^{a}	2.15±0.71^{a}	4.67±0.30^{a}
Vmst 45g	47.00±7.07^{ab}	12.00±1.41^{ab}	10.55±0.78^{a}	2.40±0.14^{ab}	1.70±0.28^{ab}	3.08±0.69^{b}
Vmst 90g	42.00±8.49^{b}	10.50±2.12^{b}	9.00±0.57^{a}	2.10±0.28^{b}	1.50±0.00^{b}	2.36±0.32^{b}
Vmst 135g	53.00±2.83^{ab}	13.50±0.71^{ab}	9.80±0.57^{a}	2.25±0.21^{ab}	1.55±0.21^{b}	2.63±0.60^{b}
Vmst+CD45g	62.50±3.54^{ab}	14.50±0.71^{ab}	10.80±3.96^{a}	2.05±0.71^{b}	1.45±0.71^{b}	2.23±0.19^{b}
Vmst+CD90g	40.50±4.95^{b}	10.00±1.41^{b}	9.00±0.99^{a}	2.45±0.64^{ab}	1.55±0.49^{b}	2.97±1.65^{b}
Vmst+CD135g	67.00±4.24^{a}	17.00±1.41^{a}	11.15±1.20^{a}	2.35±0.71^{ab}	1.65±0.71^{ab}	2.91±0.04^{b}
CD 45g	62.00±2.83^{ab}	15.50±0.71^{ab}	11.90±0.57^{a}	2.50±0.28^{ab}	1.60±0.14^{b}	3.02±0.60^{b}
CD 90g	41.50±14.85^{b}	10.50±3.54^{b}	10.35±0.64^{a}	2.35±0.71^{ab}	1.65±0.71^{ab}	2.91±0.21^{b}
CD 135g	48.00±22.63^{ab}	12.00±5.66^{ab}	10.25±1.77^{a}	2.10±0.41^{b}	1.60±0.28^{b}	2.54±0.62^{b}

Values represent mean ± SD. Values with the same letter are not significantly different at $p \leq 0.05$. Vmst = Vermicast; Vmst + CD =Vermicast plus Cow dung; CD = Cow dung

Table 10: Effects of Vermicast and Cow Dung on *Arachis hypogaea* (Groundnut) at 5WAP

Treatments	Leaf Number (cm)	Branch Number (cm)	Plant Height (cm)	Leaf Length (cm)	Leaf Breadth (cm)	Leaf Area (cm^2)
Control	71.00±0.00^{a}	18.00±0.00^{a}	13.75±0.35^{a}	2.95±0.21^{a}	2.15±0.71^{a}	4.75±0.19^{a}
Vmst 45g	62.50±7.78^{a}	16.00±1.41^{a}	12.00±2.83^{a}	2.40±0.14^{a}	1.70±0.28^{a}	3.08±0.69^{a}
Vmst 90g	53.50±2.12^{a}	13.50±0.71^{a}	11.20±1.70^{a}	2.10±0.28^{a}	1.50±0.00^{a}	2.36±0.32^{a}
Vmst 135g	58.50±6.36^{a}	15.00±1.41^{a}	10.30±1.13^{a}	2.30±0.28^{a}	1.55±0.21^{a}	2.70±0.69^{a}
Vmst+CD45g	71.50±0.71^{a}	18.00±0.00^{a}	11.00±4.24^{a}	2.05±0.71^{a}	1.45±0.71^{a}	2.23±0.19^{a}

Vmst+CD90g	54.00±14.14[a]	13.50±3.54[a]	11.00±0.71[a]	2.75±1.06[a]	1.65±0.64[a]	3.66±2.63[a]
Vmst+CD135g	83.00±9.90[a]	21.00±2.83[a]	12.25±1.06[a]	2.35±0.71[a]	1.65±0.07[a]	2.91±0.04[a]
CD 45g	82.00±2.83[a]	20.50±0.71[a]	13.15±0.21[a]	2.50±0.28[a]	1.60±0.14[a]	3.02±0.60[a]
CD 90g	50.00±19.80[a]	12.50±4.95[a]	12.30±1.41[a]	2.35±0.71[a]	1.65±0.07[a]	2.91±0.21[a]
CD 135g	69.50±41.72[a]	17.50±10.61[a]	12.85±2.47[a]	2.45±0.64[a]	1.80±0.57[a]	3.44±1.90[a]

Values represent mean ± SD. Values with the same letter are not significantly different at p≤0.05. Vmst = Vermicast; Vmst + CD =Vermicast plus Cow dung; CD = Cow dung.

Chlorophyll and Carotene result of *Glycine max (soybean)*

The chlorophyll and carotene result of *Glycine max* (soybean) as presented in Table 11 reveals that the Chlorophyll a for all the treatments (0.80±0.04[b] 1.13±0.00[ab] 1.05±0.35[ab] 1.18±0.08[ab] 1.03±0.35[ab] 1.40±0.20[a] 1.24±0.18[ab] 1.16±0.01[ab] 1.33±0.21[ab]) and control (1.27±0.44[ab]) are not significantly different. The chlorophyll b for all the treatments and controls are not significantly different. The total chlorophyll for all the treatments and controls is not significantly different. The carotene results for all the treatments and controls are not significantly different. This result of the study aligns with the one carried out by Shafique *et al*. (2021), who also used vermicompost for marigold production in Azad Kashmir, Pakistan.

Table 11: Chlorophyll and Carotene result of *Glycine max (soybean)*

Treatments	Chlorophyll a	Chlorophyll b	Total chlorophyll	Carotene result
Control	1.27±0.44[ab]	0.62±0.21[ab]	18.92±6.50[ab]	5.06±2.21[a]
Vmst 45g	0.80±0.04[b]	0.35±0.06[b]	11.46±0.94[b]	3.20±0.87[a]
Vmst 90g	1.13±0.00[ab]	0.49±0.00[ab]	16.15±0.03[ab]	4.21±0.16[a]
Vmst 135g	1.05±0.35[ab]	0.49±0.15[ab]	15.38±4.98[ab]	3.74±1.87[a]
Vmst+CD 45g	1.18±0.08[ab]	0.53±0.03[ab]	17.07±1.02[ab]	4.36±0.67[a]
Vmst+CD 90g	1.03±0.35[ab]	0.49±0.18[ab]	15.18±5.29[ab]	4.26±1.22[a]
Vmst+CD135g	1.40±0.20[a]	0.67±0.14[a]	20.64±3.41[a]	5.54±1.23[a]
CD 45g	1.24±0.18[ab]	0.59±0.10[ab]	18.30±2.80[ab]	4.97±1.25[a]
CD 90g	1.16±0.01[ab]	0.54±0.02[ab]	16.95±0.28[ab]	4.63±0.10[a]
CD 135g	1.33±0.21[ab]	0.63±0.12[ab]	19.68±3.29[ab]	5.45±1.50[a]

Values represent mean ± SD. Values with the same letter are not significantly different at p≤0.05. Vmst = Vermicast; Vmst + CD =Vermicast plus Cow dung; CD = Cow dung

Chlorophyll and Carotene result of *Arachis hypogaea* (Groundnut)

The chlorophyll and carotene result of *Arachis hypogaea* (Groundnut) as presented in Table 12 reveals that Vmst + CD 90g has the highest chlorophyll a but is not significantly different from Vmst 135g, Vmst + CD 45g, Vmst 45g, control, Vmst 90g, CD 45g and CD 135g. Vmst + CD 135g has the lowest chlorophyll but is not significantly different from CD 90g, CD 135g, CD 45g, Vmst 90g, and control. The chlorophyll b for all the treatments and controls are not significantly different. The total chlorophyll for all the treatments and controls are not significantly different. The carotene results for all the treatments and controls are not significantly different. This result of the study is by the research carried out by Arancon *et al.* (2006), whose study focused on how vermicompost application induced plant growth hormones such as auxins and humic acid produced by microorganisms.

Fresh weight and Dry weight of *Glycine max* (soybean)

The result of fresh weight and dry weight of *Glycine max* (soybean) as presented in Table 13 reveals that the fresh weight for all the treatments and control is not significantly different. The dry weight for all the treatments (0.85 ± 0.09^{a} 0.69 ± 0.05^{a} 1.21 ± 0.34^{a} 1.61 ± 0.97^{a} 0.99 ± 0.74^{a} 1.66 ± 0.34^{a} 1.39 ± 0.53^{a} 1.06 ± 0.48^{a} 1.37 ± 0.62^{a}) and control (1.08 ± 1.02^{a}) are not significantly different. The result of the study is in line with that of (Atiyeh, 2001), whose study showed how vermicompost caused increased growths in terms of shoot and root dry weight of Petunia.

Table 12: Chlorophyll and Carotene result of *Arachis hypogaea* (Groundnut)

Treatments	Chlorophyll a	Chlorophyll b	Total chlorophyll	Carotene result
Control	1.07 ± 0.16^{abc}	0.53 ± 0.03^{a}	15.98 ± 1.32^{ab}	5.16 ± 0.15^{a}
Vmst 45g	1.13 ± 0.01^{ab}	0.48 ± 0.00^{a}	16.11 ± 0.10^{ab}	5.06 ± 0.05^{a}
Vmst 90g	1.03 ± 0.17^{abc}	0.47 ± 0.01^{a}	15.05 ± 1.75^{ab}	4.74 ± 0.16^{a}
Vmst 135g	1.22 ± 0.17^{a}	0.53 ± 0.09^{a}	17.49 ± 2.64^{a}	5.40 ± 0.63^{a}
Vmst+CD 45g	1.13 ± 0.20^{ab}	0.47 ± 0.10^{a}	15.94 ± 2.99^{ab}	4.80 ± 0.94^{a}
Vmst+CD 90g	1.16 ± 0.12^{a}	0.55 ± 0.00^{a}	17.15 ± 1.27^{a}	5.27 ± 0.01^{a}
Vmst+CD135g	0.70 ± 0.03^{c}	0.32 ± 0.05^{a}	10.26 ± 0.15^{b}	3.09 ± 0.20^{b}
CD 45g	0.96 ± 0.30^{abc}	0.39 ± 0.13^{a}	13.55 ± 4.25^{ab}	4.36 ± 1.46^{ab}
CD 90g	0.73 ± 0.18^{bc}	0.42 ± 0.14^{a}	11.52 ± 3.17^{ab}	5.27 ± 0.01^{a}
CD 135g	1.05 ± 0.10^{abc}	0.52 ± 0.19^{a}	15.64 ± 2.85^{ab}	3.09 ± 0.20^{b}

Values represent mean ± SD. Values with the same letter are not significantly different at $p\leq0.05$. Vmst = Vermicast; Vmst + CD =Vermicast plus Cow dung; CD = Cow dung

Fresh weight and Dry weight of *Arachis hypogaea* (Groundnut)

The result of fresh weight and dry weight of *Arachis hypogaea* (Groundnut) as presented in Table 14 reveals CD 135g as the highest fresh weight but not significantly different from CD 45 g, Vmst + CD 135 g, control, Vmst 45 g, Vmst 90 g, Vmst 135 g, Vmst + CD 45 g,Vmst + CD 90 g and CD 90 g are not significantly different. The dry weight reveals that CD 135 g has the highest dry weight but not significantly different from CD 45 g, Vmst + CD 135 g, control, Vmst 45 g, Vmst 90 g, Vmst 135 g, Vmst + CD 45 g, Vmst + CD 90 g, and CD 90 g are not significantly different

Table 13: Fresh weight and Dry weight of *Glycine max* (soybean)

Treatments	Fresh weight	Dry weight
Control	4.27±3.78[a]	1.08±1.02[a]
Vmst 45g	3.48±0.94[a]	0.85±0.09[a]
Vmst 90g	2.83±0.59[a]	0.69±0.05[a]
Vmst 135g	3.80±0.64[a]	1.21±0.34[a]
Vmst+CD 45g	6.83±3.32[a]	1.61±0.97[a]
Vmst+CD 90g	3.69±2.81[a]	0.99±0.74[a]
Vmst+CD 135g	8.60±2.49[a]	1.66±0.34[a]
CD 45g	5.30±1.34[a]	1.39±0.53[a]
CD 90g	3.80±1.74[a]	1.06±0.48[a]
CD 135g	6.27±4.14[a]	1.37±0.62[a]

Values represent mean ± SD. Values with the same letter are not significantly different at p≤0.05. Vmst = Vermicast; Vmst + CD =Vermicast plus Cow dung; CD = Cow dung

Table 14: Fresh weight and Dry weight of *Arachis hypogaea* (Groundnut)

Treatments	Fresh weight	Dry weight
Control	12.24±1.61[cde]	2.59±0.18[bcd]
Vmst 45g	9.00±2.81[de]	1.89±0.66[bcd]
Vmst 90g	7.39±0.77[e]	1.57±0.33[d]
Vmst 135g	7.36±0.44[e]	1.44±0.04[d]
Vmst+CD 45g	12.53±4.20[cd]	2.32±0.45[bcd]
Vmst+CD 90g	10.91±0.34[cde]	2.11±0.02[bcd]
Vmst+CD 135g	14.73±1.99[bc]	3.13±1.39[abc]
CD 45g	17.94±1.28[ab]	3.20±0.59[ab]
CD 90g	9.39±2.60[de]	1.76±0.49[cd]
CD 135g	20.78±0.78[a]	4.16±0.16[a]

Values represent mean ± SD. Values with the same letter are not significantly different at p≤0.05. Vmst = Vermicast; Vmst + CD =Vermicast plus Cow dung; CD = Cow dung

The effects of vermicast, cow dung, and the combination of vermicast and cow dung on the physiology and growth performance of *Glycine max* and *Arachis hypogaea* were investigated. As indicators of the two-plant species under study, quantitative traits including plant height, leaf number, branch number, leaf length, and leaf breadth as well as fresh and dry weight were looked at. The levels of carotene and chlorophyll in both species were examined concerning plant physiology.

The combination of vermicast and cow dung is the most successful therapy out of the three; vermicast is the least effective. Though at different concentrations, the three treatments were found to improve the two-plant species' physiology, weight, and growth. This is in agreement with the study of Shafique *et al*. (2023) who reported that vermicompost not only enhanced the seed germination and growth of pansy but also improved soil health. Vermicast and cow dung have been found to significantly influence the growth and development of both *Glycine max* (soybean) and *Arachis hypogaea* (groundnut). Another study showed that vermicompost produced from cow dung resulted in a highly significant difference in the height and yield of the plants (Njoku *et al*., 2012).

Vermicast has been found to influence the yield and nutrient quality of peanuts which is in line with a study conducted by Fernandez (2020) at Cagayan State University, Philippines, which used different treatments of vermicast and mudpress on peanut plants. On the other hand, cow dung has also been found to influence the growth and yield of *Arachis hypogaea*. This study found that the growth of *A. hypogaea* in terms of plant height, number of leaves, stem girth, and leaf area was significantly enhanced which is also in line with the study of Mathivanan *et al.* (2012) whose study involved the effect of vermicast on growth parameters like root length, shoot length, nodulation, fresh weight, and dry weight.

CONCLUSION

The results presented in this study showed that both vermicast and cow dung had positive effects on the growth, yield, and nutrient quality of *Glycine max* and *Arachis hypogaea*. However, the specific effects can vary depending on the specific treatments and conditions.

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