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RESEARCH ARTICLE

# EARLY GROWTH RESPONSE AND NUTRIENTS QUALITY OF FIG (*Ficus carica* L.) PLANTED ON BRIS SOIL EFFECTED BY CHICKEN MANURE AMENDMENTS

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**ABSTRACT**

Allah S.W.T swears by the fig tree (Sura' 95, al-Tin) in the holy Quran, for its values and practices. Recently, the fig tree (*Ficus carica* L.) has been introduced in Malaysia's tropical weather as it grows well with maximum activity. Its root favors a well-drained type of soil, and since BRIS (Beach Ridges Interspersed with Swales) are dominated by sandy texture with proper water percolation, it has a high potential for fig planting. However, BRIS is known to have low nutrient holding capacity but can be improved with organic amendments. This study was carried out to determine the effects of various rates of chicken manure as amendments in improving the BRIS soil health for the growth of fig trees. The BRIS soil was amended with different rates of 10% (T2), 20% (T3), 30% (T4), and 50% (T5) of chicken manure and 0% (T1) as control. Three months old saplings were propagated through hardwood cuttings of variety BTM6 with five replications in each treatment. The growth response and nutrients quality of the fig trees were observed biweekly for three months after the transplant, and the nutrient contents of amended and non-amended showed significant differences at $p<0.05$. The survivability of the trees was 100%, and a significant difference was found between the treatments. BRIS soil with 40% chicken manure amendments (T4) showed superlative growth response with the highest number of branches, leaves, and fruits, thus provide higher yield production as compared to other treatments. From this study, BRIS soil that is known to be problematic can be improved with correct rates of organic amendments and can be used for fig cultivation.

**KEYWORDS**

Fig, BRIS soil, organic amendment, growth response, nutrients quality.

## 1. Introduction

It is released from Abu al-Darda' that when the Prophet S.A.W. was given as a present a tray of figs, he said: 'Eat.' And he ate from them and said: 'If I were to say that any fruit descended from Paradise, I should say these. For the fruit of Paradise has no stone. So eat it as it cures various diseases.' Fig (*Ficus carica* L.) is among the oldest fruits mainly grown in the Mediterranean region, and the fig tree is one of the thousands of *Ficus* species bearing edible fruits (Turk and Aksoy, 2011). This plant needs warm and dry temperatures to be grown. However, it is widely spread to several climates and can be cultivated in tropical and sub-tropical regions. The root system of fig is relatively shallow but extensive. It thrives well in most types of soil, but it performs the best in well-drained, heavy clays, rich loams, and light sandy soils (Patil and Patil, 2011).

The fig is one of the earliest fruit trees cultivated by man due to its medicinal and traditional uses. Various parts of the plants, like leaves, fruits, and seeds, are medicinally important. The fresh and dried fruits are commonly known for their laxative action, and the leaf decoction is taken as a remedy for diabetes and calcifications in the kidneys and liver (Morton, 1987). It is reported to be rich in minerals, vitamins, and low in calories (Farhangi et al. 2014). Figs also have a presence of numerous phenolic compounds that able to act as an antioxidant and favorable to human health (Mawa et al. 2013).

Beach ridges interspersed with swales (BRIS) soil, which contained more than 90% of sand, is known as problematic soil in Malaysia (Khairi et al. 2011). It is the major type of soil that can be found along the east coast of Peninsular Malaysia from Kelantan, Terengganu, Pahang, and right down along the coast to the west of Johor. Approximately 2 million people in Malaysia depend on this poor BRIS soil for economic survival (Malisa et al. 2011). Therefore, the need for its improvement is essential. However, BRIS soil health, water holding capacity, and nutrient status can be increased with various types of amendments such as manure, organic matter, and compost. The nutrient availability was improved through pH alteration made by compost, which enhances the activity of the microorganisms responsible for breaking it down. A few crops had been found suitable to be planted on amended BRIS soil around Malaysia, such as coconut, sweet potato, vegetable crops, kenaf, and roselle (Jahan et al. 2014; Basri et al. 2013; Nur Amirah et al. 2015).

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Common fig has been cultivated in Malaysia and managed to adapt and survive in the local weather and environmental condition, suggesting that common fig trees also have the potential to be planted on BRIS soil with correct rates of amendments. Therefore, this study was carried out to observe the effects of different rates of chicken manure at the early stage of planting in improving the BRIS soil health for the growth of fig trees.

## 2. Materials and Methods

### 2.1 Study Site

This study was carried out within three months under open planting at the Glasshouse and Nursery Complex, International Islamic University Malaysia, Kuantan Campus, Pahang (3°51'08.3"N, 103°18'42.0"E) with an elevation of 55m. The mean temperature is about 28°C with relative humidity 85.4%, and the mean daily rainfall amount is 138.3mm.

### 2.2 Soil Preparation and Experimental Design

The experimental pot consisted of five different treatments of BRIS soil amended with chicken manure at different rates, which are 10% (T2), 20% (T3), 30% (T4), and 50% (T5) of and 0% (T1). A 3-months old fig sapling of variety Brown Turkey Modified (BTM6) propagated through hardwood cuttings were used for this study. The experiment was conducted in Randomized Complete Block Design (RCBD) with five replications in each treatment. All pots received irrigation from dripping, applying water two times a day, and 10g of 15:15:15 fertilizer applied every two weeks.

### 2.3 Soil and Chicken Manure Analysis

Soil samples of each treatment were taken at early planting and were analyzed for physical and chemical properties. Soil pH was determined using the glass electrode pH meter (Metler Toledo FE20, Switzerland) using soil: water ratio of 1: 2.5. The texture of the soil combination was analyzed using Particle Size Analyzer (PSA) (Mastersizer, 2000). Total carbon was determined using a carbon analyzer (LECO CR-412, USA). The total N was determined by using the Kjeldahl digestion method (Bremner and Mulvaney, 1982). Extractable P, K, Ca, Mg, Fe, Cu, Zn, and Mn were determined by the Mehlich III method (Mehlich, 1984). Chemical analysis of the chicken manure solely was also carried out as same as the soil. The content of N, P, and K was measured by auto analyzer (AA) (Lachat QuikChem FIA 8000 series, USA) while, the content of Ca, Mg, Fe, Cu, Zn, and Mn were measured by using atomic absorption spectrometry (AAS) (Perkin Elmer 400, USA).

### 2.4 Leaf Nutrients Analysis

Third, leaves from the basal end were sampled with three replicate each pot before analysis. The lamina of leaf samples was selected to perform the analysis of N, P, K, Ca, Mg, Fe, Cu, Zn, and Mn by using the wet digestion method. The contents of N, P, and K were measured by auto analyzer (AA) (Lachat QuikChem FIA 8000 series, USA) while, the content of Ca, Mg, Fe, Cu, Zn, and Mn were measured by using atomic absorption spectrometry (AAS) (Perkin Elmer 400, USA).

### 2.5 Growth Response

The morphological growth response of trees was assessed by measuring the height of trees, stem girth, number of branches, number of leaves, number of fruits, and survivability observed biweekly for three months after planting.

### 2.6 Statistical Analysis

The collected data were analyzed statistically by the Statistical Analysis System (SAS 9.2). Data collected were statistically analyzed by using two-way analysis of variance (ANOVA), and the significant differences were analyzed using the LSD test at $p<0.05$.

## 3. Results and Discussion

The pH of the chicken manure is 7.02, which is considered neutral, while the total C content is high, and the C/N ratio of the chicken manure was 16.37. The desirable C/N ratio is range 15 to 20, as the restrain of N is minimal within this range (Rosen et al. 1993). This ratio promotes rapid composting and provides available nitrogen in the finished compost. Chicken manure contains both organic and inorganic forms of plant nutrients. The application of chicken manure was found to help in retaining soil nutrients and reduces water loss through the process of evaporation for BRIS soil (Ishaq et al. 2013). The high amount of nutrients and carbon content in chicken manure used can compensate for the nutrient deficiency in BRIS soil.

**Table 1:** Chemical compositions of chicken manure.

| Properties | Unit | Amount |
|---|---|---|
| pH | | 7.02 |
| Total C | (%) | 22.91 |
| C/N Ratio | | 16.37 |
| N | (%) | 1.40 |
| P | (%) | 0.109 |
| K | (%) | 1.540 |
| Ca | (%) | 0.84 |
| Mg | (%) | 0.60 |
| Fe | (mg/kg) | 146.5 |
| Cu | (mg/kg) | 37.26 |
| Zn | (mg/kg) | 125.7 |
| Mn | (mg/kg) | 220.1 |

### 3.1 Effects of Different Rates Chicken Manure on Soil Physico-chemical Characteristics

The physical and chemical properties of soil samples taken at early planting were shown in Table 2. The soil texture was identified as sand for T1 (control) and T2 while loamy sand for T3, T4, and T5. Mixing the organic amendments with BRIS soil was found to reduce the percentage of sand and increase the percentage of silt and clay hence improve the soil texture. Meanwhile, soil chemical properties changed significantly after the application of chicken manure compared to control. The pH of T1, which is the control, is 5.53, and this showed that the BRIS soil is acidic. Soil pH indicates soil nutrient conditions. At low pH, beneficial elements such as phosphorus (P), magnesium (Mg), and calcium (Ca) become less available to plants due to the bases cations, which are bound weakly to the soil and can leach out. The pH of amended BRIS soil of T2, T3, T4, and T5 was higher than non-amended BRIS (T1) with a pH value of 6.99, 8.60, 8.58, and 8.82, respectively. Chicken manure tends to increase the pH value of acidic soils [9]. The increasing pH of the treatments was due to the increasing rates of chicken manure amendments in this study. The availability of nutrients in the soil for plant uptake is controlled by pH, and most nutrients are only available at pH 6.0 (Plaster, 1992).

A significant increase in the content of macro and micro-nutrients were observed in all the treatments relative to control ($p<0.05$), which prove that the addition of organic amendments improved soil fertility. The C content increased to 1.53% for T5 as compared to T1 (control), with only 0.19%. Application of organic amendment in the growing media promotes soil C content and improved soil physical properties with increased stability of aggregates to water (Mordogan et al. 2013; Arthur et al. 2012). Thus, this further highlighted organic amendment helps to improved soil aggregation and increased soil C content. Furthermore, N content for the treatments increased significantly ($p<0.05$) with increasing amount of organic amendment incorporated as T1 (0.02%), followed by T2 (0.07%), T3 (0.15%), (0.19%), and T5 (0.24%). However, different rates of chicken manure application significantly reduced the C/N ratio from 11.44 in T1 to 6.3 in T5. In general, the macro and micro-nutrients concentrations were increased with the increase of the application rate of the organic amendment in BRIS soil, which might be contributed by the compost itself.

This indicates that the application of chicken manure as organic amendments in BRIS soil leads to a valuable source of plant nutrients. It also assists in increasing the soil nutrient holding capacities and thus provides favorable conditions for the fig plant growth.

### 3.2 Effects of Different Rate of Organic Amendment on Leaf Nutrients Content

The nutrients content of leaf samples were shown in Table 3. The macro-nutrients (N, P, K, Ca, and Mg) showed significant content ($p<0.05$) between amended (T2, T3, T4, and T5) and non-amended (T1) treatments. The N, P, and K contents varied from 2.11% to 3.37%, 0.05% to 0.09%, and 1.91% to 2.22%, respectively. The Ca and Mg content varied from 0.41% to 2.54% and 0.06% to 0.90%, respectively. The N, P, K, Ca, and Mg is vital during the first month after planting as it is needed for the vegetative growth of the fig plants.

The tested rates of chicken manure application have no significant effects on Cu, Zn, and Mn except for Fe concentration of the lamina when compared to the non-amended. Iron (Fe) concentration starts to show a significantly different ($p<0.05$) at T3 as compared to T2 and T1. This is similar to a study that tested different levels of cow and sheep manure mixtures on fig leaf nutrients. The dilution effect on the leaf nutrient contents might result due to the utilization of the nutrients for increased shoot and fruit size and the number of leaves. Micronutrients are needed by plants as it affects the resistance of disease attack. A deficiency in the micronutrient content will impair the plant defence response (Agrios, 2005). This might be an indicator of the problem of fig rust infection that can be observed on the fig trees as it lacks micro-nutrients to support the disease resistance.

**Table 2:** Physico-chemical characteristics of soil samples at planting.

| Treatments | pH | Soil Texture | Total C (%) | C/N Ratio | N | P | K | Ca | Mg | Fe | Cu | Zn | Mn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | (%) | | | | | (mg/kg) | | | |
| T1 (Control) | 5.53 | Sand | 0.19 | 11.44 | 0.02±0.01$^{e}$ | 0.001±0.001$^{e}$ | 0.011±0.009$^{d}$ | 0.03±0.01$^{d}$ | 0.01±0.01$^{d}$ | 49.21±2.20$^{d}$ | 0.14±0.03$^{e}$ | 0.94±0.65$^{d}$ | 0.57±0.16$^{c}$ |
| T2 (10%) | 6.99 | Sand | 0.31 | 4.66 | 0.07±0.03$^{d}$ | 0.014±0.001$^{d}$ | 0.048±0.003$^{cd}$ | 0.15±0.02$^{c}$ | 0.05±0.01$^{c}$ | 67.19±5.87$^{c}$ | 1.93±0.23$^{d}$ | 7.89±0.50$^{cd}$ | 4.98±1.04$^{c}$ |
| T3 (15%) | 8.60 | Loamy Sand | 0.84 | 5.72 | 0.15±0.02$^{c}$ | 0.043±0.007$^{c}$ | 0.105±0.062$^{bc}$ | 0.35±0.09$^{ab}$ | 0.11±0.03$^{b}$ | 85.44±8.52$^{b}$ | 4.93±1.10$^{c}$ | 21.91±5.13$^{bc}$ | 17.92±5.00$^{bc}$ |
| T4 (30%) | 8.58 | Loamy Sand | 1.41 | 7.38 | 0.19±0.03$^{b}$ | 0.053±0.005$^{b}$ | 0.176±0.076$^{ab}$ | 0.24±0.10$^{bc}$ | 0.14±0.02$^{b}$ | 90.64±9.15$^{ab}$ | 6.49±0.68$^{b}$ | 33.77±9.61$^{ab}$ | 34.46±13.10$^{ab}$ |
| T5 (50%) | 8.82 | Loamy Sand | 1.53 | 6.30 | 0.24±0.01$^{a}$ | 0.063±0.007$^{a}$ | 0.248±0.058$^{a}$ | 0.45±0.06$^{a}$ | 0.19±0.02$^{a}$ | 98.67±1.50$^{a}$ | 9.42±0.95$^{a}$ | 43.45±15.08$^{a}$ | 48.22±16.47$^{a}$ |

*Means with different letters are significantly different at $p<0.05$.

**Table 3:** Nutrients content of leaf samples after three months of planting.

| Treatments | N | P | K | Ca | Mg | Fe | Cu | Zn | Mn |
|---|---|---|---|---|---|---|---|---|---|
| | (%) | | | | | (mg/kg) | | | |
| T1 (Control) | 2.11±0.269$^{b}$ | 0.05±0.01$^{b}$ | 2.00±0.30$^{a}$ | 0.42±0.11$^{c}$ | 0.06±0.02$^{c}$ | 617.60±243.64$^{ab}$ | 61.67±19.09$^{a}$ | 159.17±111.84$^{a}$ | 35.47±18.25$^{a}$ |
| T2 (10%) | 3.37±0.473$^{a}$ | 0.09±0.01$^{a}$ | 1.91±0.16$^{a}$ | 1.14±0.10$^{b}$ | 0.18±0.01$^{c}$ | 333.87±59.94$^{bc}$ | 52.50±21.36$^{a}$ | 66.67±16.07$^{ab}$ | 45.07±15.35$^{a}$ |
| T3 (15%) | 3.07±0.157$^{a}$ | 0.08±0.01$^{a}$ | 2.22±0.35$^{a}$ | 2.26±0.36$^{a}$ | 0.53±0.08$^{b}$ | 670.93±262.91$^{a}$ | 57.50±8.66$^{a}$ | 66.67±12.83$^{ab}$ | 53.20±15.45$^{a}$ |
| T4 (30%) | 3.07±0.541$^{a}$ | 0.08±0.01$^{a}$ | 2.17±0.16$^{a}$ | 2.14±0.34$^{a}$ | 0.66±0.10$^{b}$ | 387.20±147.82$^{abc}$ | 59.17±8.04$^{a}$ | 64.17±21.26$^{b}$ | 52.80±21.75$^{a}$ |
| T5 (50%) | 3.14±0.564$^{a}$ | 0.08±0.03$^{a}$ | 2.09±0.34$^{a}$ | 2.54±0.15$^{a}$ | 0.90±0.18$^{a}$ | 272.00±101.32$^{c}$ | 66.67±17.02$^{a}$ | 51.67±12.33$^{b}$ | 48.80±7.66$^{a}$ |

*Means with different letters are significantly different at $p<0.05$.

### 3.3 Effects of Different Rates of Chicken Manure on Morphological Growth Response

Several parameters of morphological growth response after three months of planting were recorded in Table 4. All treatments, including control, showed 100% of survivability, indicating that fig trees have immense potential to be planted on BRIS soil. The plant height was significantly different ($p<0.05$) between amended (T2, T3, T4, and T5) and non-amended (T1) soil, ranged from 39.8 to 64.6 cm. The stems girth for T3 and T4 were significantly different ($p<0.05$) compared to other treatments, ranged from 1.42 to 2.35 cm. Meanwhile, the number of branches of T1 showed the lowest compared to amended soil (T2, T3, T4, and T5) with T4 had the highest number ($p<0.05$). The number of leaves also showed a significant difference between amended and non-amended soil with T3 showed the highest number. As for the number of fruits, there was a significant difference ($p<0.05$) between amended and non-amended BRIS soil, where T4 showed to have the highest number. This result indicates that the addition of an organic amendment to BRIS soil increased the plant height, stem girth, and the number of leaves of the fig trees with T3 showed the best among other treatments followed by T4. Amended BRIS soil significantly affects ($p<0.05$) the number of branches and fruits with T4 shows the best among other treatments. This result indicated that the addition of chicken manure as an amendment to BRIS soil increased its health and promotes the growth of fig trees. The results were consistent with the previous result that suggested the organic amendment increase BRIS soil health and the rice yields.

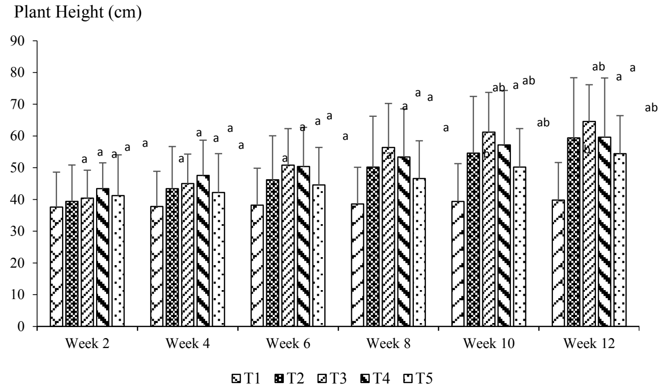
**Table 4:** Plant growth responses after three months of planting.

| Treatment | Survivability (%) | Plant Height (cm) | Stem Girth (cm) | Number of Leaves | Number of Branches | Number of Fruits |
|---|---|---|---|---|---|---|
| T1 (Control) | 100 | 39.8$^{b}$ | 1.42$^{b}$ | 20$^{d}$ | 2$^{c}$ | 0$^{c}$ |
| T2 (10%) | 100 | 59.4$^{a}$ | 1.61$^{b}$ | 33$^{cd}$ | 10$^{b}$ | 10$^{ab}$ |
| T3 (15%) | 100 | 64.6$^{a}$ | 2.35$^{a}$ | 53$^{a}$ | 12$^{ab}$ | 5$^{bc}$ |
| T4 (30%) | 100 | 59.6$^{a}$ | 2.26$^{a}$ | 49$^{ab}$ | 14$^{a}$ | 15$^{a}$ |
| T5 (50%) | 100 | 54.4$^{a}$ | 1.80$^{b}$ | 31$^{bc}$ | 12$^{a}$ | 9$^{abc}$ |

*Means with the different letters are significantly different at $p<0.05$.

#### *3.3.1 Effects of different rates of chicken manure on plant height*

Figure 1 showed that T1 had the lowest plant height compared to other treatments at week 10 and week 12. The slower growth of plant height supports the low physicochemical properties of the soil and leads to the low quantity of nutrients received by plants. The acidity of sandy soil and low contents of organic matters can be a threat to crop growth. The capacity for saving water and nutrients is poor due to the loose texture and the gap between particles. On the other hand, T3 showed the highest plant height and followed by T4, T2, and T5. This may result due to the effects of organic amendments on the BRIS soil that enhance the nutrient content and adsorption as it can receive sufficient nutrients. The effects of soil amendments started to show significant different ($p<0.05$) at week 10 and 12. Various nutrients crops need to contain in organic fertilizers such as cattle, and sheep manure is released gradually in step with changing demand for developing crops (Jianming et al. 2008).

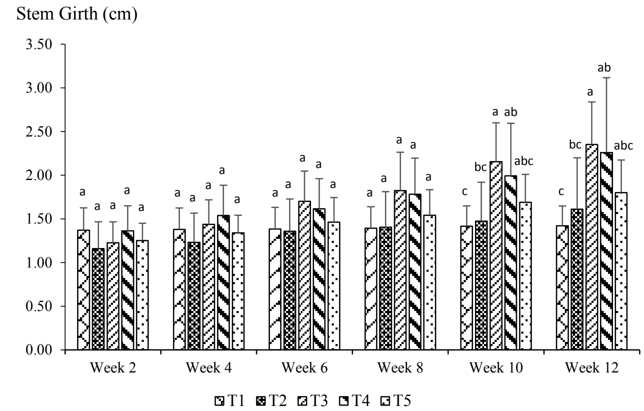



*Means with different letters are significantly different at $p<0.05$

**Figure 1:** Effects of different rates of chicken manure on plant height (cm) of fig trees

### *3.3.2 Effects of different rates of chicken manure on stem girth*

At week 2 to week 8, the size of the stem girth varied among all treatments with no significant difference observed ($p<0.05$) (Figure 2). However, at weeks 10 and 12, T1 significantly had the smallest stem girth compared to other treatments. At week 12, T3significantly had the widest stem girth ($p<0.05$) followed by T4, T5, and T2. This might be due to the different rates of chicken manure amended. Excessive amounts of chicken manure applications might cause a longer time to make it available for the plants and might inhibit the growth of plants. Similar results, like a combination of extreme amounts of chicken manure with chemical fertilizer, could inhibit the growth of kenaf because of the excessive soluble salts supplied by the chicken manure.

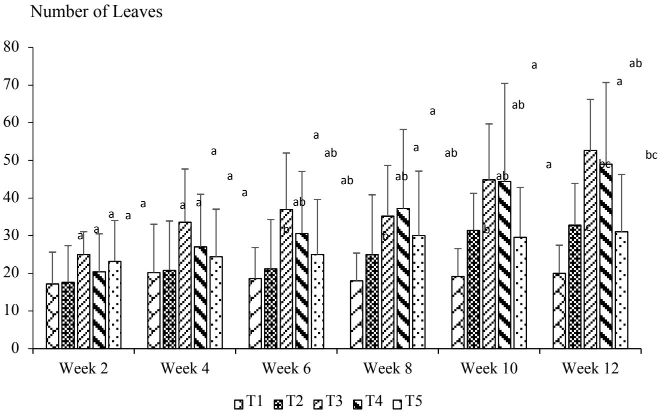



*Means with different letters are significantly different at $p<0.05$

**Figure 2:** Effects of different rates of chicken manure on stem girth (cm) of fig trees

### *3.3.3 Effects of different rates of chicken manure on the number of leaves*

The number of leaves of T1 had the least compared to other treatments at week 6 to week 12 ($p<0.05$) (Figure 3). During week 6, T3 started to significantly show the highest number of leaves compared to other treatments. This result could be due to the nutrient availability demanded by the plant growth as it in the vegetative growth phase from the organic amendment. At week 8, T3 and T4 showed the highest number of leaves, but the following week both treatments showed an almost similar number. This result may be due to the effects that the fig trees have been infected by the fig rust disease for all treatments. It had caused many leaves to die and drop and lead to the changes in the number of leaves. This finding can be supported by leaf nutrient content analysis that shows a deficient in the micronutrient content as mentioned that such deficiency would reduce the plant defense response against diseases. Thus, deteriorating the plant defense system and making it vulnerable to diseases and affecting the growth response.

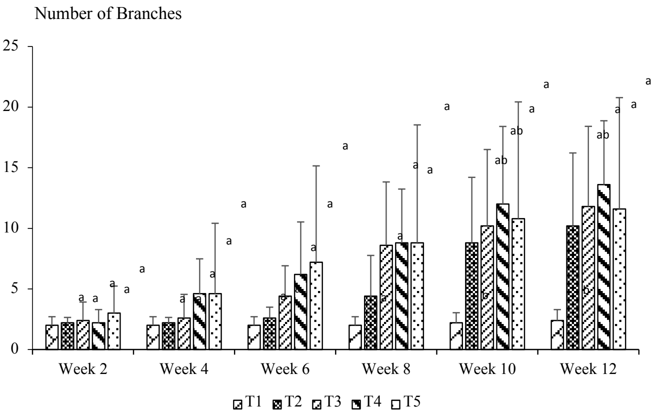



*Means with different letters are significantly different at $p<0.05$

**Figure 3:** Effects of different rates of chicken manure on the number of leaves of fig trees

### *3.3.4 Effects of different rate of chicken manure on the number of branches*

Figure 4 showed that T1 had the lowest number of branches significantly compared to other treatments starting at week 10 and 12 ($p<0.05$). The T4 showed the highest number of branches, followed by T5, T3, T2, and T1. High numbers of branches produce a high number of fruits, as mentioned the nature of fig trees bear fruits at every branch. Control has the lowestnumber of branches, and this indicated that low nutrients contain in the BRIS soil lead to low production of new branches. Sufficient chicken manure application in BRIS soil helps to improve its health and could promote yield production.

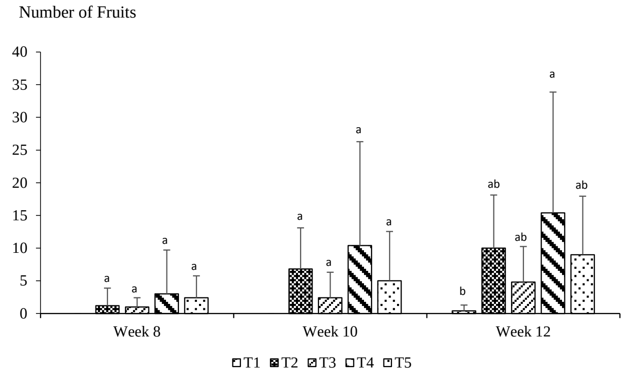



*Means with different letters are significantly different at $p<0.05$

**Figure 4:** Effects of different rates of chicken manure on the number of branches of fig trees

### *3.3.5 Effects of different rate of chicken manure on the number of fruits*

The numbers of fruits were started to be measured in week 8, as shown in Figure 5, as it is observed to be the reproductive growth phase. This observation could be due to the high amount of N, which had prolonged the vegetative growth phase and hence delayed the reproductive growth phase. During weeks 8 and 10, no significant difference observed between the treatments. However, at week 12, T4 showed the highest number of fruits ($p<0.05$) followed by T2, T5, T3, and T1. The number of fruits in control was significantly the lowest. This might result due to the lack of nutrients contained in the BRIS soil. A similar observation was found in the yield of rice that planted on BRIS soil with a large amount of sand (> 90%), very low physical, and chemical characteristics. Therefore, it is suggested that BRIS soil amended with organic substances help to increase the physicochemical characteristic of BRIS soil hence improving its yield.




*Means with different letters are significantly different at p<0.05

**Figure 5:** Effects of different rates of chicken manure on the number of fruits of fig trees

## 4. Conclusion

Amending BRIS soil with chicken manure can be one of the best approaches to improve the soil physicochemical characteristic as chicken manure is easily accessed and allows the farmers to reduce the cost of fig planting. The survivability of the trees was 100% survived. At week 10 and week 12, there was a significant difference ($p<0.05$) between the treatments as T4 which has 30% of chicken manure amendments showed the most superlative growth with the highest number of branches, leaves, and fruits thus provide higher yield production as compared to other treatments. However, considering the economic aspect of fig planting, the best treatment recommended would be 30% of the application of chicken manure in order to achieve optimum growth response. Since Malaysia is an Islamic country, it would be an excellent opportunity for fig trees to be commercialized by our country as it has a high economic value for our residence benefit and to be exported internationally, especially among Asian countries.

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## References

Agrios, G.N. 2005. Plant pathology (5th ed.). Burlington, Massachusetts: Elsevier Academic Press.

Arthur, E., W. Cornelis, F. Razzaghi. 2012. Compost amendment of sandy soil affects soil properties and greenhouse tomato productivity. Compost Science and Utilization, 20(4), 215-221. 10

Basri, M.H.A., A. Abdu, S. Jusop, O.H. Ahmed, H. Abdul-Hamid, M.A. Kusno, B. Zainal, A.L. Senin, N. Junejo. 2013. Effects of mixed organic and inorganic fertilizers application on soil properties and the growth of kenaf (*Hibiscus cannabinus L.*) cultivated on BRIS soils. American Journal of Applied Sciences, 10(12), 1586-1597.

Bremner, J.M., C.S. Mulvaney. 1982. Total N. In Methods of Soil Analysis. 2nd edition (pp. 600-601). Pages, A. L. (Ed.). Madison: American Society of Agronomy.

Farhangi, H., M. Ajilian, M. Saeidi, G.H. Khodaei. 2014. Medicinal fruits in Holy Quran. International Journal of Pediatrics (Supplement 4), 4(8), 89-102.

Ishaq, U.M., H.M.E. Armanto, M.A. Adzemi. 2013. Performances of BRIS soils genesis and classification in Terengganu, Malaysia. Journal of Biology, Agriculture and Healthcare, 3(20), 86-92.

Jahan, M.S., I. Muslianie, M.M. Khandaker. 2014. Effects of soil amendments on BRIS soil health, crop physiology and production. International Journal of Research and Innovation in Earth Science, 1(1), 6-9.

Jianming, L., W. Pute, M.H. Behboudian, W. Zhonghong, Z. Zhirong, A. Morton. 2008. Responses of muskmelon to cattle or sheep manure compost mixed with sandy soil. Journal of Organic Systems, 3(2), 40-50.

Khairi, M.C.L., M.N. Nozulaidi, M.I. Musliania, Y.M. Khanif, M.J. Sarwar. 2011. Composting increases BRIS soil health and sustains rice production. Science Asia, 37, 291-295.

Malisa, M.N., J. Hamdan, M.H.A. Husni. 2011. Yield response of kenaf (Hibiscus cannabinus L.) to different rates of charcoal and nitrogen fertilizer on BRIS soils in Malaysia. Middle East Journal of Scientific Research, 10(1), 54-59.

Mawa, S., K. Husain, I. Jantan. 2013. Ficus carica L. (Moraceae): Phytochemistry, traditional uses and biological activities. Evidence-Based Complementary and Alternative Medicine, 1-8.

Mehlich, A. 1984. Mehlich 3 soil test extractant: A modification of Mehlich 2 extractant. Communication in Soil Science and Plant Analysis, 15, 1409-1416.

Mordogan, N., H. Hakerlerler, S. Ceylan, S. Aydin, B. Yagmur, U. Aksoy. 2013. Effect of organic fertilization on fig leaf nutrients and fruit quality. Journal of Plant Nutrition, 36, 1128-1137.

Morton, J. 1987. Fig. In J. F. Morton (Ed.). Fruit of warm climates, 47-50. Miami: FL

Nur Amirah, Y., A.A. Alias, W.S. Wan Zaliha. 2015. Growth and water relations of roselle grown on BRIS soil under partial root zone drying. Malaysian Applied Biology, 44(1), 63-67.

Patil, V.V., V.R. Patil. 2011. Ficus carica Linn. - An overview. Research Journal of Medicinal Plant, 5(3), 246-253.

Plaster, E.J. 1992. Soil science and management (2nd ed.). New York: Delmar Publisher Inc.

Rosen, C.J., T.R. Halbach, B.T. Swanson. 1993. Horticultural uses of municipal solid waste components. Horticulture Technology, 3(2), 167–173.

Turk, F.H., U. Aksoy. 2011. Comparison of organic, biodynamic and conventional fig farms under rain-fed condition in Turkey. Journal of Cell and Plant Sciences, 2(3), 22-33.