

Utilization Macro Nutrients in the Selected Extracts of Coconut Oil Cake, Paddy Husk, Outer Cover of Vigna Mungo Used for the Preparation of Vermicompost

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ABSTRACT

Bio-fertilizer are rich in NPK by utilize vermicompost bio fertilizer, biological process of composting with earthworms can cause to enhance the process of waste conservation and produce better endpoint. The decompose of difficult agriculture products can made as compost with help of earthworms as vermicomposting. The NPK enrich the soil nutrient and promote better growth for crops.

Key words

NPK, Vermicompost, Bio-fertilizer.

INTRODUCTION

Vermicompost is a bio fertilizer it is rich in nutritional content. It is an excellent plant growth promoter. Vermicompost is a product of decomposition in which the organic waste turns into the valuable manure. Earthworm utilizes the organic waste and produce vermicast. This vermicast are rich in organic carbon, nitrogen, phosphorous, potassium and sodium. Vermicompost is nothing but the excreta of earthworm instead of using chemical fertilizer, vermicompost contain high nutrition.

Vermicomposting which involves the composting of organic waste through earthworm activity has been observed by Edwards and Webster, 2000. The vermicomposting process ensure more favourable mineralization (Ramalingam and Ranganathan, 2001). Vermicomposting is process of digestion and due to this material is converted into the worm cast. Vermicomposting are widely used in organic farming. Using microorganism and earthworm that are active between 10 to 32°C (not room temperature, but the temperature inside the pile of moist organic material). It is a mesophilic method. (Vermi co, 2001 and Tera crescent, 2003).

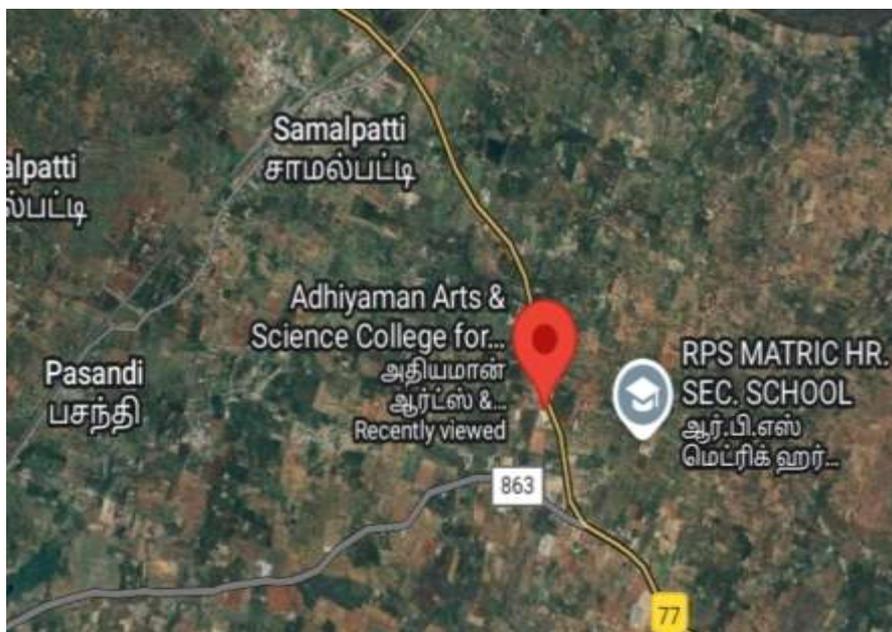
The vermicomposting contains nutrients and organic compounds that are useful for plants. The decomposition process of the earthworm itself processes their ability to thrive which is used to condition the soil. (Iwai et al., 2011). Vermitechnology has been developed as a means of using earthworm changing waste into value added product. Which can be utilized for improving soil structure and fertility. Adding composting to soils can help to replenish soil organic carbon. Which can help to improve soil health. (Iwai et al., 2011 and Lal. 2004).

Vermicompost produced through the breakdown of organic waste by earthworms, is highly valued in sustainable agriculture for its numerous benefits. This natural fertilizers enriches the soil with essential nutrients, improves soil structure and enhances its water retention capacity, making it more fertile and robust for plant growth. (Javed et al., 2022). The uses of vermicompost contributes to waste reduction by recycling organic kitchen and garden waste into valuable plant nutrients. (Ansari et al., 2020 and Theunissen et al., 2010). Vermicompost a rich nutrient -packed organic fertilizers produced by the digestion of organic waste by earthworms, contain not only essential plant nutrients like nitrogen, phosphorus, and potassium but also a variety of beneficial microorganisms improve soil structure , increase soil aeration. Which are crucial for healthy plant development. (Lehman et al., 2015).

The nutrient-rich organic manure left behind by earthworms contains humus, NPK, micronutrients, growth hormones, beneficial bacteria, enzymes, and antibiotics (Kumar et al., 2018). Earthworms are essential to the processes of soil formation and fertility maintenance. The earthworm biomass and high quality organic soil conditioner, the vermicompost. The physical action includes substrates mixing and loosening, maintaining aerobic condition and actual grinding. The biochemical action is the breakdown of the substrate by beneficial microorganisms in the earthworm's gut. (Rupani P.F, et al., 2013). Vermicompost production, studying the enzymatic activities are most important to check the soil fertility and ecosystem status. They are also used to describe the fast driven process of vermicomposting. Moreover, microbes are the primary decomposers in composting. Microbial enzymes play an important role in making the compost more effective. (Lakshmanan and Muthunayanan 2016).

STUDY AREA

For this study, the soil was collected from the garden of Adhiyaman arts and Science College for women in kurusampatti village, Uthangarai taluk, Krishnagiri district, Tamilnadu. In that college, there is a plenty of red soil is available and worms are also collected from the same garden. Where the soil was collected. *Eudrilus eugeniae* is more in population.



MATERIALS AND METHODS

The compost was prepared with four different setups. For environmental purposes four plastic tubs were maintained namely Control (A), Coconut oil cake (B), Rice cake (C), and Outer cover of Vigna mungo (D). The organic materials were mixed with soil for decomposition upto 45 days.

An attempts has been made to provide vermicompost by using Coconut oil cake, Rice husk, and Outer cover of Vigna mungo.

1. The collection of earthworm from garden soil.
2. Coconut oil cake, Rick husk, Outer cover of Vigna mungo is collected from my farmhouse.
3. Prepare the vermicompost bed with coconut oil cake, rice husk, and outer cover of vigna mungo.
4. After composting is assayed to find the content of the vermicompost and production time and days.

OBSERVATION

In our study the variation in the Nitrogen, Phosphorous and potassium have been observed in the samples.

RESULT

TABLE 1: OPTIMUM TEMPERATURE MAINTAIN FOR VERMICOMPOSTING

| S.NO | MONTH | TEMPERATURE |
|------|----------|-------------|
| 1 | NOVEMBER | 24°C |
| 2 | DECEMBER | 25°C |
| 3 | JANUARY | 27°C |

FIGURE 1: OPTIMUM TEMPERATURE MAINTAIN FOR VERMICOMPOSTING

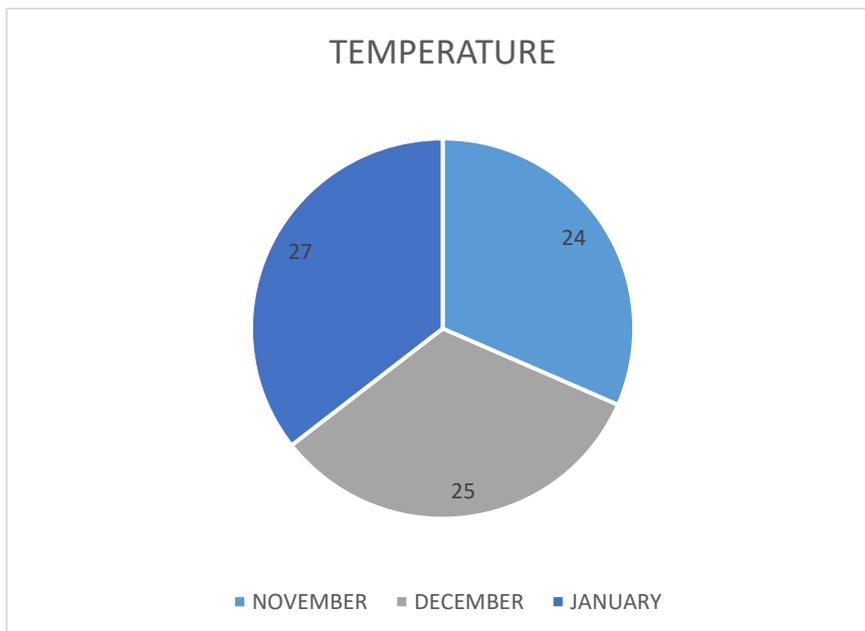


TABLE 2: LEVELS OF N₂ – BEFORE COMPOSTING

| Sample (A) | Sample (B) | Sample (C) | Sample (D) |
|------------|------------|------------|------------|
| 12 | 14 | 12 | 10 |

FIGURE 2: LEVEL OF N₂ – BEFORE COMPOSTING

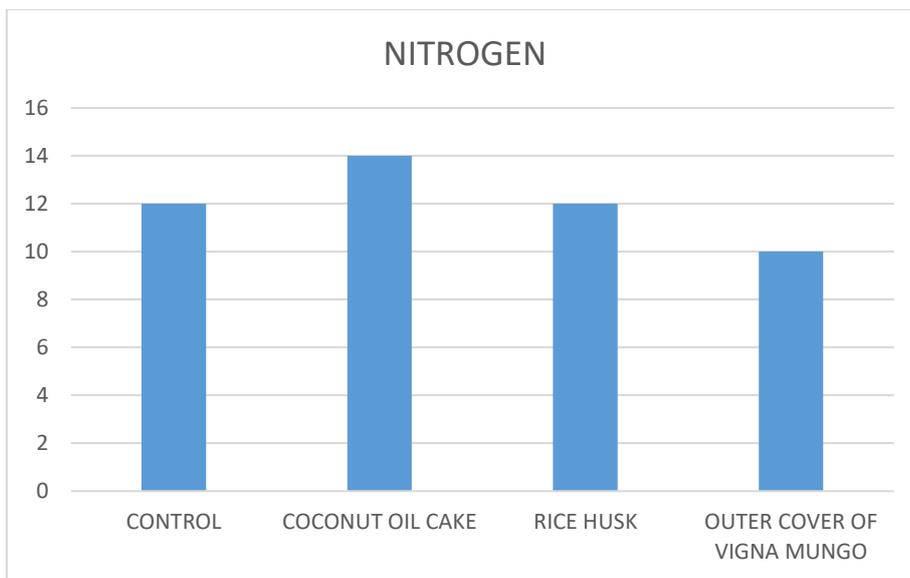


FIGURE 3: LEVEL OF N₂. BEFORE COMPOSTING

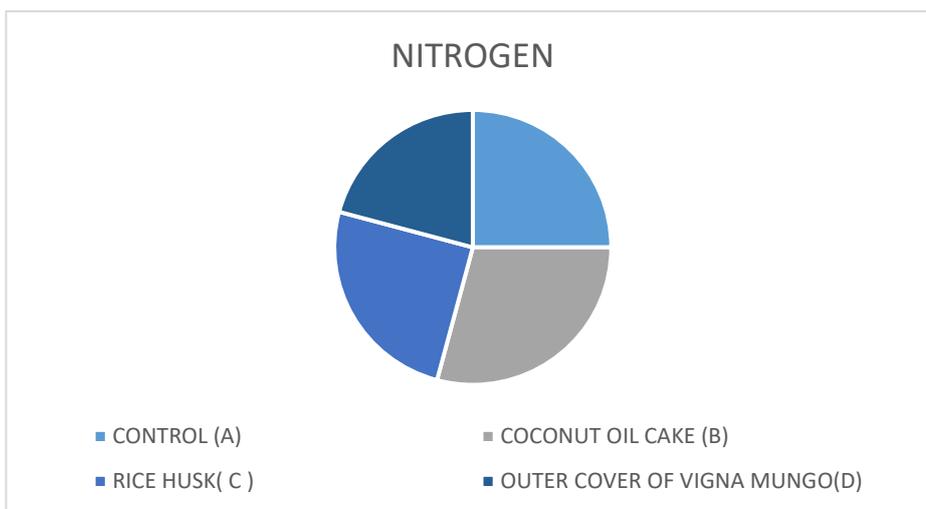


TABLE 3: LEVEL OF P₂ – BEFORE COMPOSTING

| Sample (A) | Sample (B) | Sample (C) | Sample (D) |
|------------|------------|------------|------------|
| 13 | 7 | 18 | 7 |

FIGURE 4: LEVEL OF P₂ - BEFORE COMPOSTING

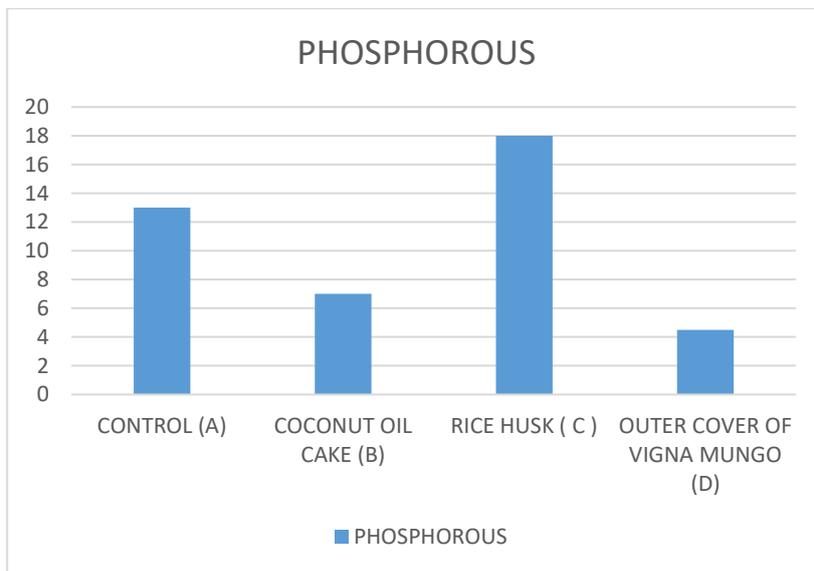


FIGURE 5: LEVEL OF P₂ – BEFORE COMPOSTING

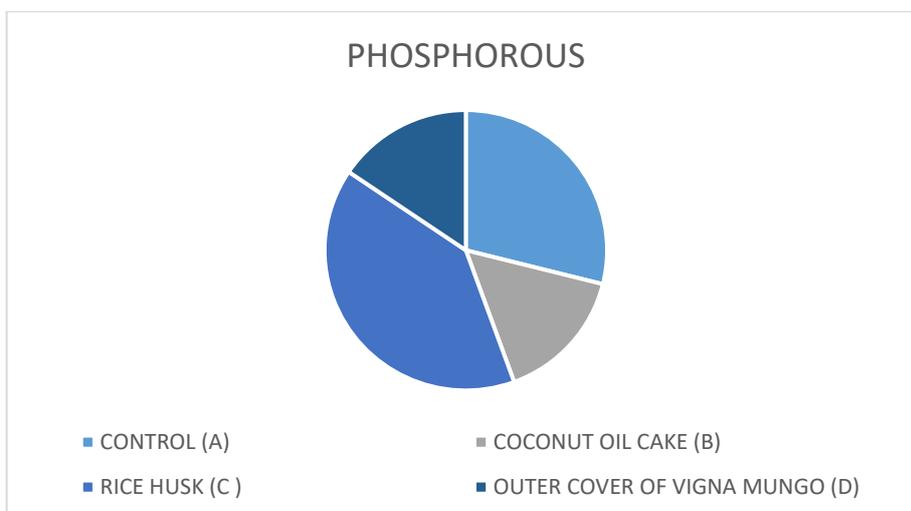


TABLE 4: LEVEL OF K₂ - BEFORE COMPOSTING

| Sample (A) | Sample (B) | Sample (C) | Sample (D) |
|------------|------------|------------|------------|
| 33 | 33 | 34 | 33 |

FIGURE 6: LEVEL OF P₂ – BEFORE COMPOSTING

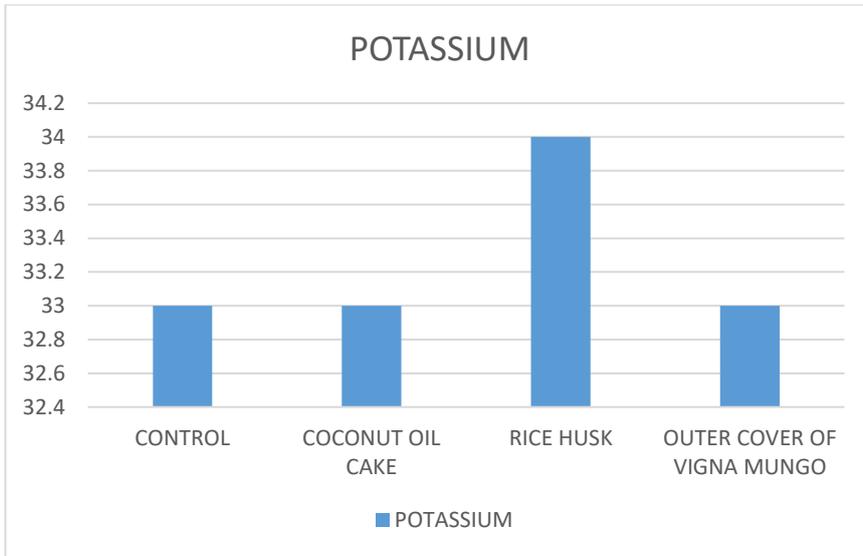
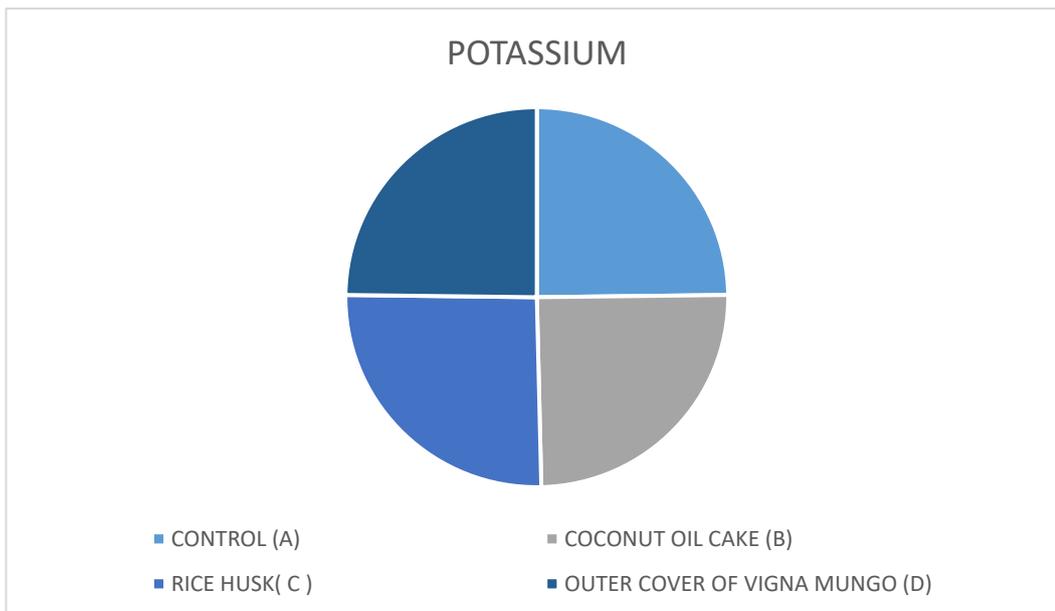


FIGURE 7: LEVEL OF P₂ – BEFORE COMPOSTING



AFTER MIXING SELECTED SUBSTRATE

TABLE 5: LEVEL OF N₂ – AFTERMIXING SELECTED SUBSTRATE

| Sample (A) | Sample (B) | Sample (C) | Sample (D) |
|------------|------------|------------|------------|
| 60 | 53 | 60 | 63 |

FIGURE 8: LEVEL OF N₂ – AFTER MIXING SELECTED SUBSTRATE

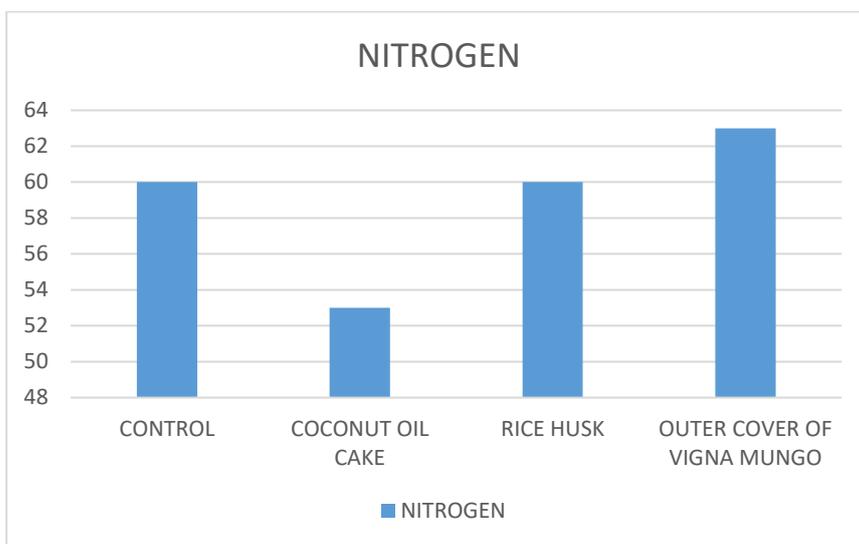


FIGURE 9: LEVEL OF N₂ – AFTER MIXING SELECTED SUBSTRATE

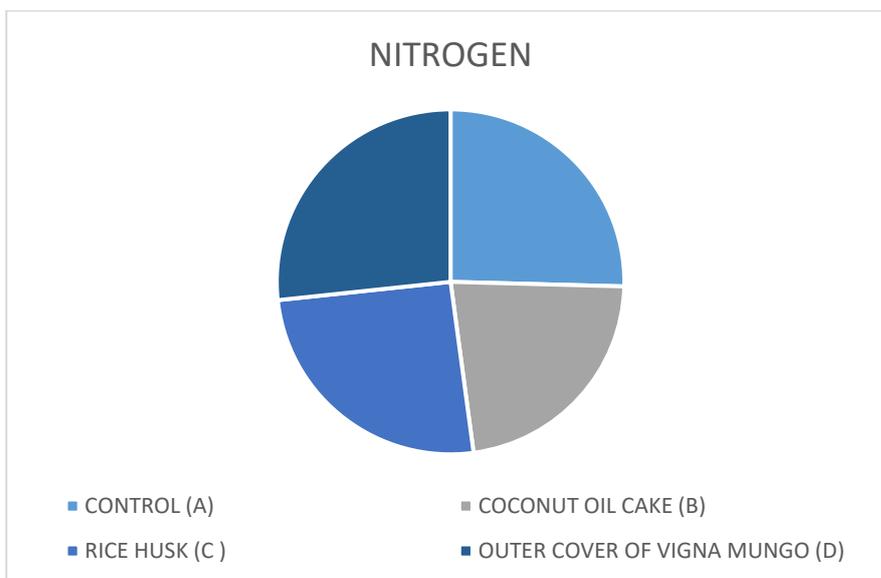


TABLE 6: LEVEL OF P₂ – AFTER MIXING SELECTED SUBSTRATE

| Sample (A) | Sample (B) | Sample (C) | Sample (D) |
|------------|------------|------------|------------|
| 60 | 85 | 40 | 50 |

FIGURE 10: LEVEL OF P₂ – AFTER MIXING SELECTED SUBSTRATE

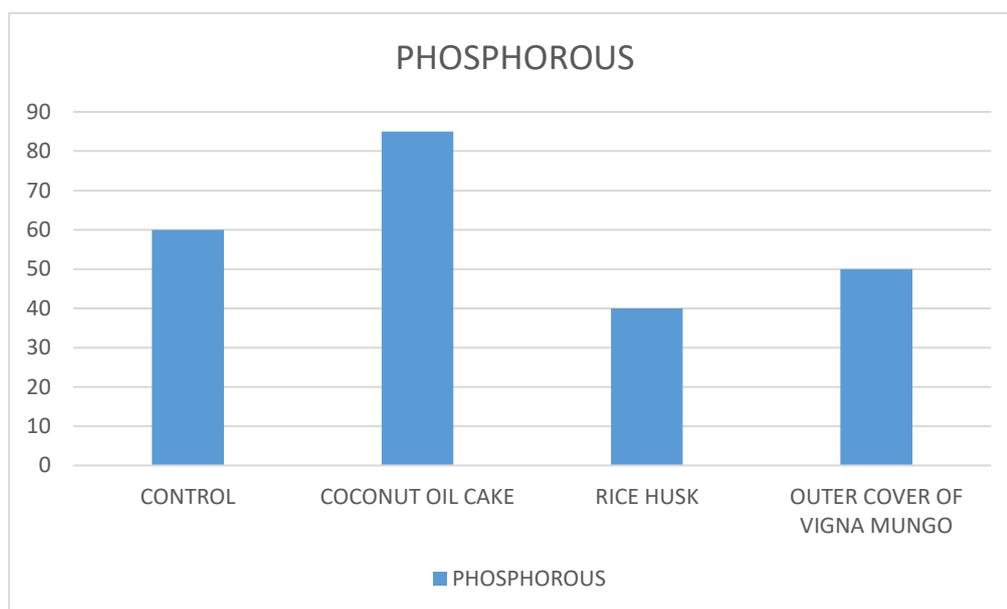


FIGURE 11: LEVEL OF P₂ – AFTER MIXING SELECTED SUBSTRATE

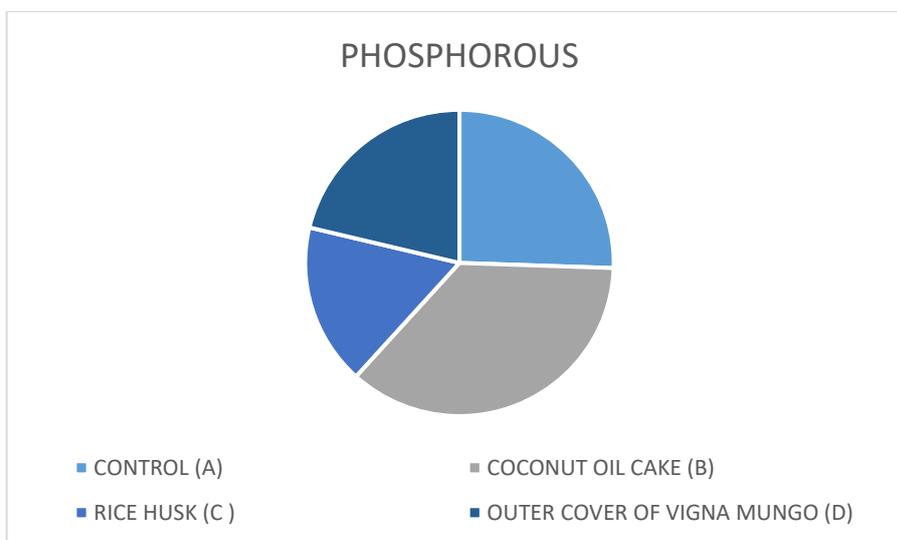


TABLE 7: LEVEL OF K₂ – AFTER MIXING SELECTED SUBSTRATE

| Sample (A) | Sample (B) | Sample (C) | Sample (D) |
|------------|------------|------------|------------|
| 293 | 240 | 319 | 371 |

FIGURE 12: K₂ – AFTER MIXING SELECTED SUBSTRATE

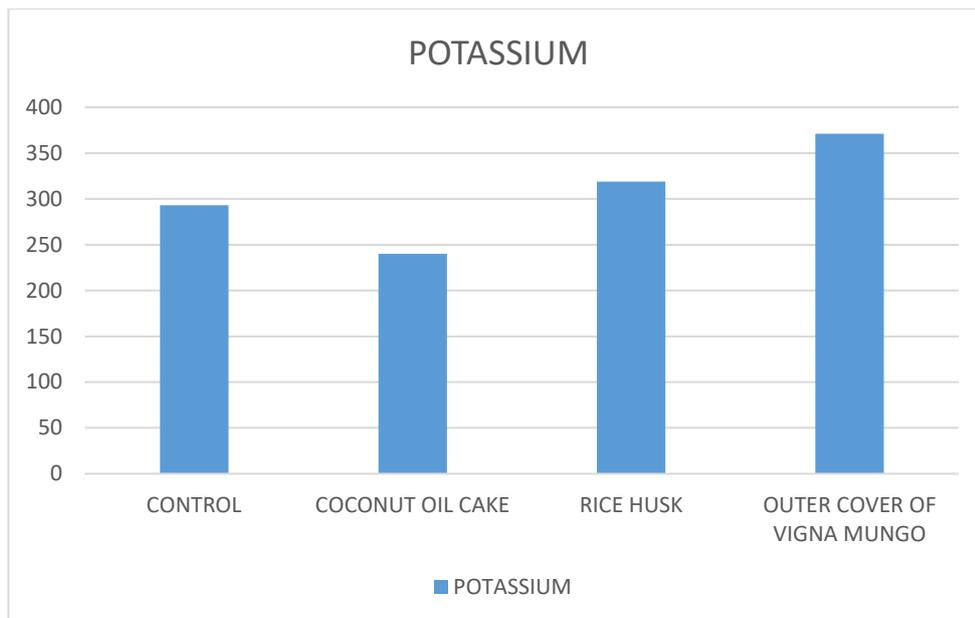
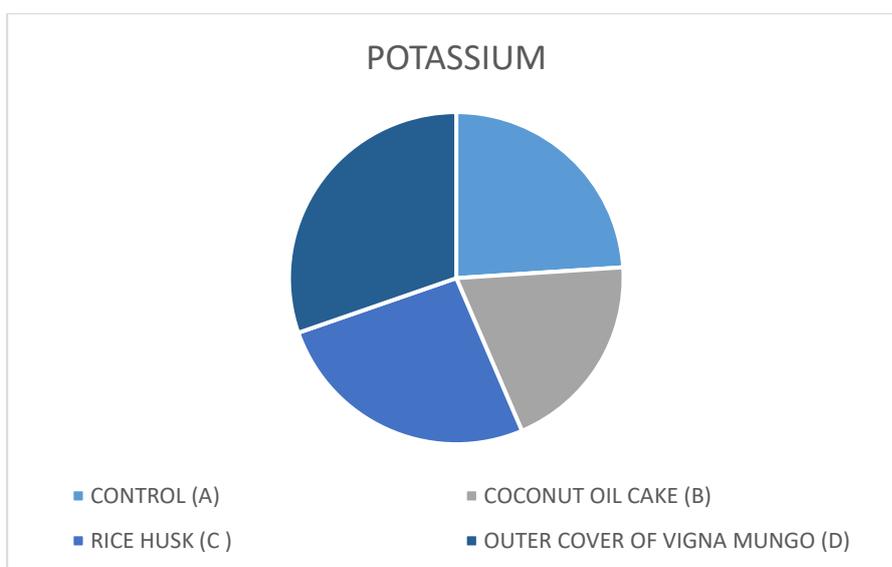


FIGURE 13: LEVEL OF K₂ – AFTER MIXING SELECTED SUBSTRATE



AFTER VERMICOMPOSTING

TABLE 8: LEVEL OF N₂ – AFTER VERMICOMPOSTING

| Sample (A) | Sample (B) | Sample (C) | Sample (D) |
|------------|------------|------------|------------|
| 88 | 89 | 75 | 97 |

FIGURE 14: LEVEL OF N₂ – AFTER VERMICOMPOSTING

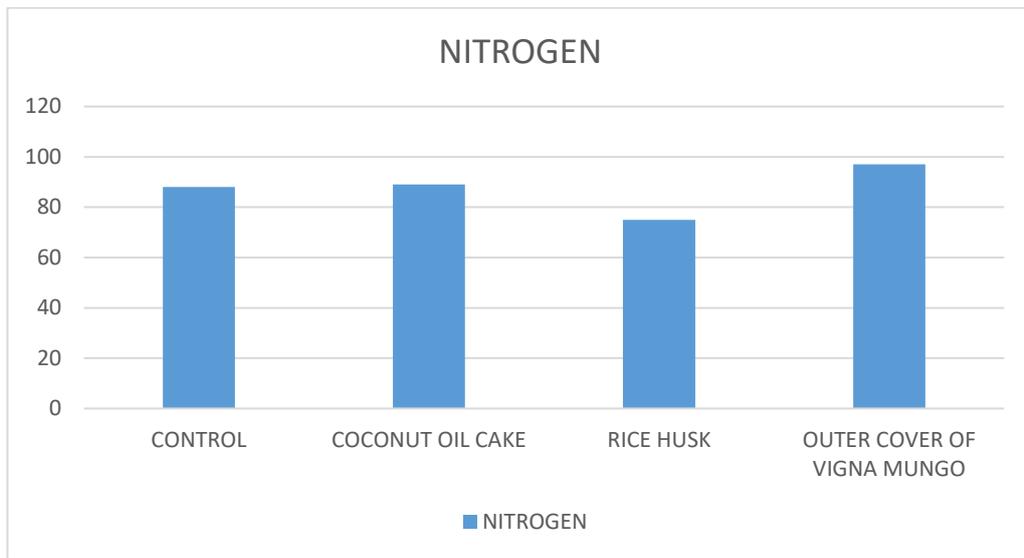


FIGURE 15: LEVEL OF N₂ – AFTER VERMICOMPOSTING

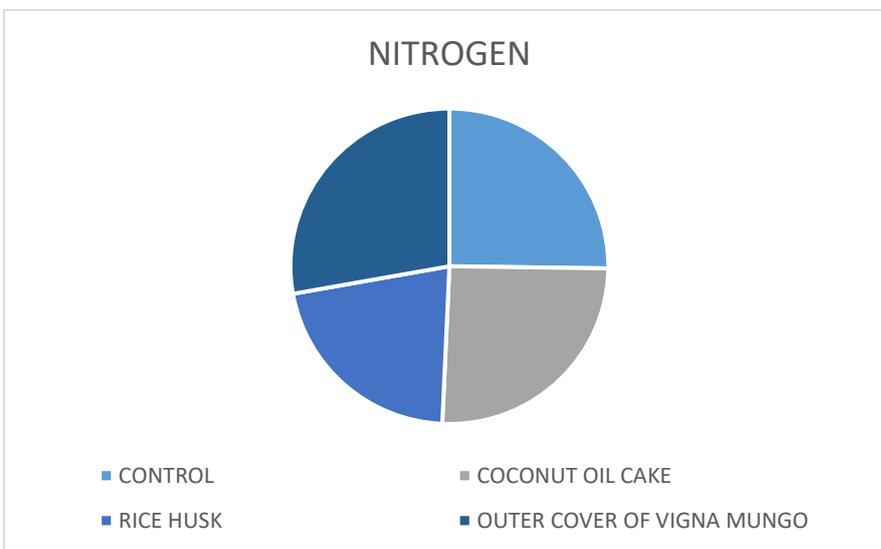


TABLE 9: LEVEL OF P₂ – AFTER VERMICOMPOSTING

| Sample (A) | Sample (B) | Sample (C) | Sample (D) |
|------------|------------|------------|------------|
| 71 | 54 | 80 | 87 |

FIGURE 16: LEVEL OF P₂ – AFTER VERMICOMPOSTING

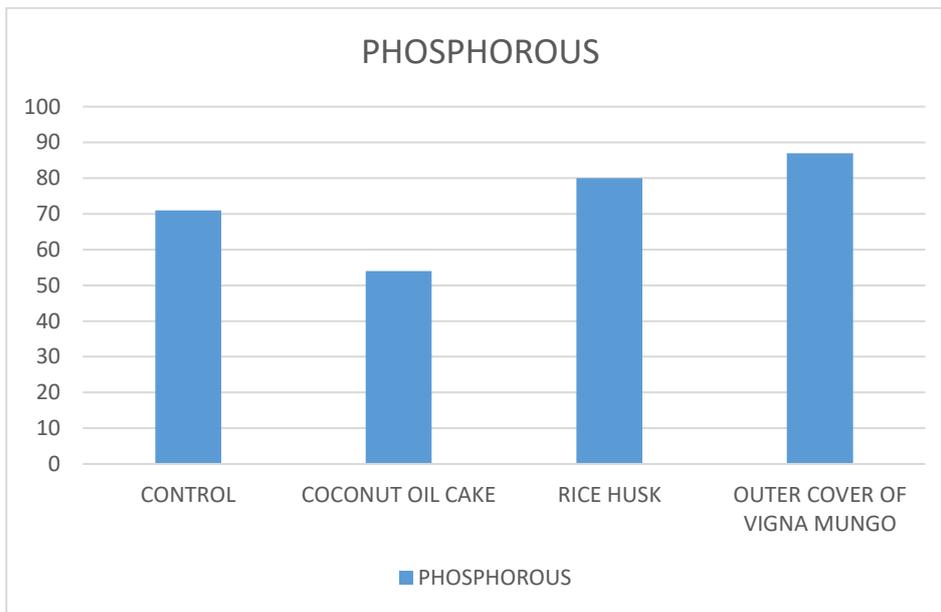


FIGURE 17: LEVEL OF P₂ – AFTER VERMICOMPOSTING

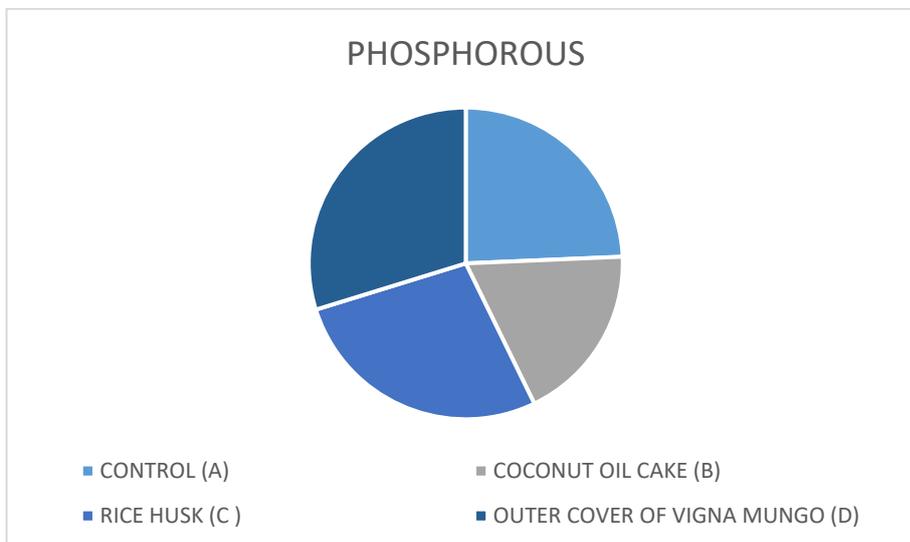


TABLE 10: LEVEL OF K₂ – AFTER VERMICOMPOSTING

| Sample (A) | Sample (B) | Sample (C) | Sample (D) |
|------------|------------|------------|------------|
| 142 | 125 | 248 | 270 |

FIGURE 18: LEVEL OF K₂ – AFTER VERMICOMPOSTING

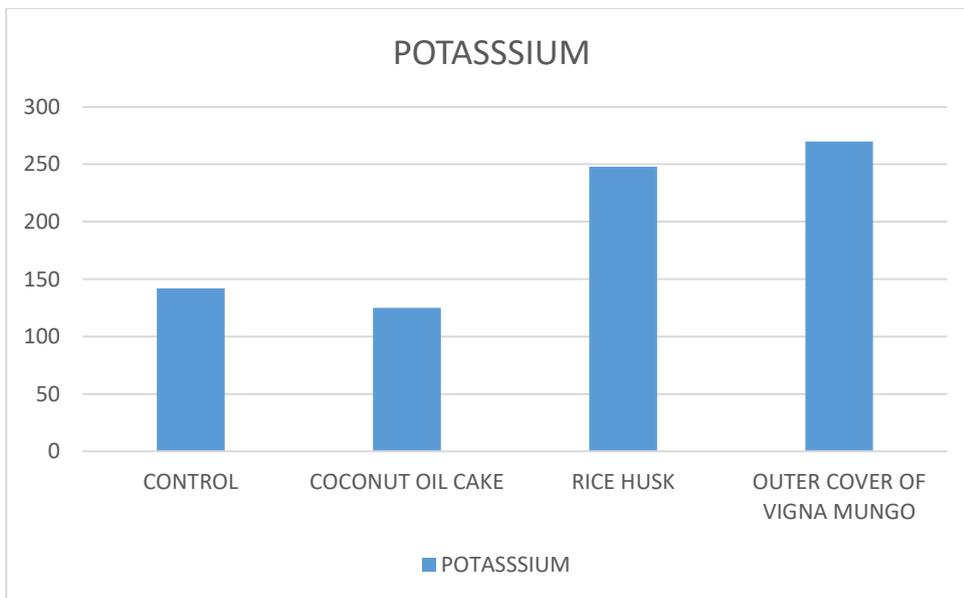
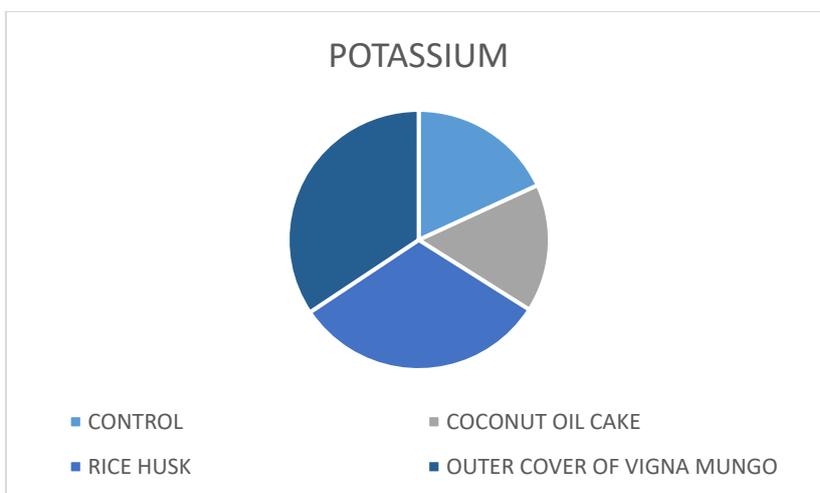


FIGURE 19: LEVEL OF K₂ – AFTER VERMICOMPOSTING



DISCUSSION

Vermicompost is having higher amount of N, P, K Ca and Mg and useful microorganisms for plant growth and also proven.

In our study of vermicomposting using common earthworm (*Eudrilus eugeniae*) was found variable depending upon the waste organic material. Coconut oil cake, Rice husk and Outer cover of *Vigna mungo* decomposed in 3 weeks, totally 5 to 6 weeks needed for complete decomposition of both coconut oil cake, rice husk and outer cover of *vigna mungo*. Earthworms are considered as natural bioreactors while proliferate along with other microorganisms and provide required conditions for the bio degradation of waste.

In the present, the Coconut oil cake, Rice husk and Outer cover of *Vigna mungo* were found to be the best substrate whereas the found rich in N, P and K Contents. Nutritional composition of vermicompost varied with the substrate used. The Nitrogen content of vermicompost was found higher than the control. The total nitrogen content of the vermicompost increased with time. Due to rapid mineralization organic nitrogenous compounds.

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