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# Influence of organic manures on leghaemoglobin content in nodules of *Glycine max* (L.) Merril. and *Vigna acontifolia* (Jacq.) Marechal

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## ABSTRACT

***An experiment was conducted at Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, Tamil Nadu (India) for analyzing the effect of biocomposted corncob and coirpith on leghaemoglobin content in nodules of soybean (Glycine max) and moth bean (Vigna aconitifolia). The experiments consists of seven treatments viz., C- control, $T_1$- compost 1 (Raw corncob composted by using Pleurotus sajor-caju (5t $ha^{-1}$)), $T_2$- compost 2 (Predigested raw corncob + Eudrilus eugeniae (5t $ha^{-1}$)), $T_3$- compost 3 (Raw corncob predigested by using Pleurotus sajor-caju and Eudrilus eugeniae (5t $ha^{-1}$)), $T_4$- compost 4 (Raw coirpith composted by using Pleurotus sajor-caju (5t $ha^{-1}$)), $T_5$- compost 5 (Predigested raw coirpith + Eudrilus eugeniae (5t $ha^{-1}$)) and $T_6$- compost 6 (Raw coirpith predigested by using Pleurotus sajor-caju and Eudrilus eugeniae (5t $ha^{-1}$)). The results revealed that leghaemoglobin content was increased from 25 to 50 DAS and its goes down gradually up to 75 DAS. The treatment $T_6$- compost 6 (Raw coirpith predigested by using Pleurotus sajor-caju and Eudrilus eugeniae (5t $ha^{-1}$)) significantly increased leghaemoglobin content followed by $T_3$ as compared to the control on 25 to 50 DAS. Hence biocomposted corncob and coirpith enhanced the leghaemoglobin content in the nodules of soybean.***

***KEY WORDS: leghaemoglobin, C- Control, T- Treatment, Pleurotus sajor-caju, Eudrilus eugeniae, DAS- Days After Sowing***

## I. INTRODUCTION

Leghaemoglobin (Lbs) are monomeric hemoproteins synthesized in the root nodules which develop through the symbiotic association of *Rhizobia* with leguminous plants. Leghaemoglobin plays an essential role in the nitrogen fixation process by providing oxygen to the bacteria for the respiration. Legumes, including beans, occupy an important place in human nutrition as in many countries they are considered as one of the staple food. Bean seeds have unique nutritive value. They are having valuable source of proteins, saccharides and several micronutrients including minerals and vitamins. They are known as rich in dietary fiber and low in fat [1]. From the nutritional point of view two legume plants (*Glycine max* and *Vigna aconitifolia*) were chosen. In this study present, it is attempted the effect of bio composted corncob and coirpith on leghaemoglobin content in the nodules of soybean and moth bean in different days after sowing.

## II. MATERIALS AND METHODS

### 2.1 Collection of agro industrial waste

The agro-industrial waste corncob and coirpith was collected from Tamil Nadu Agricultural University, Coimbatore.

 

**2.2 Compost pit preparation**

The process of composting consists of six pits of 1.5 feet length and 4 square feet width. They were named as compost 1 ($C_1$), compost 2 ($C_2$), compost 3 ($C_3$), compost 4 ($C_4$), compost 5 ($C_5$) and compost 6 ($C_6$).

**2.2.1 Corncob compost process:**

The corncob waste was subjected to decomposition by various ways and means to achieve the good quality biocompost

**2.2.2 Compost 1:**

The sundried corncob waste was transferred to $C_1$ pit. In this 20 g of *Pleurotus sajor-caju* spawn was uniformly spread. Above this a layer of one kg of corncob waste was sandwiched. This process was repeated the heap reaches a height of above one meter.

**2.2.3 Compost 2:**

$C_2$ pit was filled with corncob. It was allowed for decomposition for 30 days. Vermicomposting process adopted.

**2.2.4 Compost 3:**

$C_3$ pit was filled by corncob. It was predigested by using *Pleurotus sajor-caju* spawn. Vermicomposting process adopted.

**2.2.5 Coirpith compost preparation:**

Above same procedure was repeated instead of corncob ($C_1$, $C_2$ and $C_3$) coirpith was used in the following composting pits compost 4 ($C_4$), compost 5 ($C_5$) and Compost 6 ($C_6$) respectively.

**2.3 Experimental tray preparation: (Earthworm *Eudrilus eugeniae* used)**

After pre-decomposition predigested material was transferred to the plastic trays (30×20×20 cm) $C_2$, $C_3$, $C_5$ and $C_6$. In this fifteen exotic earthworms (*Eudrilus eugeniae*) were inoculated in to each tray. Water was sprayed regularly twice a day to maintain the moisture content. These experimental units were kept undisturbed in the shady place for 60 days. After composting the samples were taken and sieved as per the standard procedure at $90^{th}$ day.

**2.4 Pot culture experiments**

The pots were filled with 7kg of sandy clay loam soil. The six different biocompost was applied to the respective pots and mixed thoroughly. Viable seeds were selected and five seeds were sown in each pot with three replications. After germination three healthy plants were maintained per pots. There were seven treatments viz. C- control, $T_1$- compost 1(Raw corncob composted by using *Pleurotus sajor-caju* (5t $ha^{-1}$)), $T_2$- compost 2 (Predigested raw corncob + *Eudrilus eugeniae* (5t $ha^{-1}$)), $T_3$- compost 3 (Raw corncob predigested by using *Pleurotus sajor-caju* and *Eudrilus eugeniae* (5t $ha^{-1}$)), $T_4$- compost 4 (Raw coirpith composted by using *Pleurotus sajor-caju* (5t $ha^{-1}$)), $T_5$- compost 5 (Predigested raw coirpith + *Eudrilus eugeniae* (5t $ha^{-1}$)) and $T_6$- compost 6 (Raw coirpith predigested by using *Pleurotus sajor-caju* and *Eudrilus eugeniae* (5t $ha^{-1}$)). On 25, 50 and 75 DAS leghaemoglobin content was analyzed.

 

### 2.5 Estimation of leghaemoglobin content [2]

Estimated leghaemoglobin on 25 DAS, 50 DAS and 75 DAS in the nodules of soybean and moth bean.

### 2.6 Statistical Analysis

The data obtained on 25, 50 and 75 DAS were subjected to the statistical analysis (Two way Anova) and based on the results inference were drawn.

## III. RESULTS AND DISCUSSION

### 3.1 Effect of Biocompost on leghaemoglobin content of Soybean (Table 1)

The leghaemoglobin content was significantly increased in $T_6$- compost 6 (Raw coirpith predigested by using *Pleurotus sajor-caju* and *Eudrilus eugeniae* (5t $ha^{-1}$)) from 0.051 to 0.069 mg/g followed by $T_3$- compost 3 (Raw corncob predigested by using *Pleurotus sajor-caju* and *Eudrilus eugeniae* (5t $ha^{-1}$)) from 0.045 to 0.064 mg/g on 25 and 50 DAS and decreased gradually to 0.059 to 0.054 when compared to the control- C (increased from 0.018 to 0.022 mg/g up to 50 DAS and decreased to 0.019 on 75 DAS).

### 3.2 Effect of Biocompost on leghaemoglobin content of Moth bean (Table 2)

The leghaemoglobin content was found to be maximum in $T_6$- compost 6 (Raw coirpith predigested by using *Pleurotus sajor-caju* and *Eudrilus eugeniae* (5t $ha^{-1}$)) from 0.048 to 0.057 mg/g followed by $T_3$- compost 3 (Raw corncob predigested by using *Pleurotus sajor-caju* and *Eudrilus eugeniae* (5t $ha^{-1}$)) from 0.043 to 0.052 mg/g up to 50 DAS and decreased gradually to 0.049 and 0.046 mg/g on 75 DAS as compared to control- C (increased from 0.016 to 0.024 mg/g up to 50 DAS and decreased to 0.018 mg/g on 75 DAS).

The present finding is in conformity with that of [3] who concluded that the increase in leghaemoglobin content from 0.0098 to 0.0256 mg/g up to 60 DAS and declined gradually to 0.0186 mg/g up to 90 DAS over control with the combined application of vermicomposted fruit wastes+ *Pleurotus fluorescens*+ *Phosphobacter*.

The present result coincides with the result of [4] they observed maximum leghaemoglobin content of 2.00 mg/g with the application of vermicompost in the fenugreek nodules. The result is on par with [5] who observed a maximum leghaemoglobin content with the application of vermicompost (6t $ha^{-1}$) in cowpea.

The combined application of vermicompost ($T_6$ and $T_3$) might have enhanced the population of desired microbes in the root zone during the early stage of infection. Higher population of the desired organisms will always have greater possibilities of infection and formation of more healthy and effective root nodules having higher amount of leghaemoglobin.

## IV. CONCLUSION

The present study indicated that the agro industrial waste corncob and coirpith waste was reutilized for the significant development of root nodules. Biocomposted corncob and coirpith was suitable to achieve better leghaemoglobin content. Maximum leghaemoglobin content was achieved in soybean when compared to moth bean. Thus it can be inferred from the present investigation that $T_6$ and $T_3$ can be effectively consider as a value added product as compared to control and other treatments.

 

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**TABLE 1**

**EFFECT OF BIOCOMPOSTED CORNCOB AND COIRPITH ON LEGHAEMOGLOBIN CONTENT IN NODULES OF GLYCINE MAX (L.) Merril**

| Treatments | Leghaemoglobin Content (mg/g nodule weight) | | |
|---|---|---|---|
| | 25 DAS | 50DAS | 75 DAS |
| C | 0.018 | 0.022 | 0.019 |
| $T_1$ | 0.023 | 0.043 | 0.027 |
| $T_2$ | 0.033 | 0.045 | 0.037 |
| $T_3$ | 0.045 | 0.064 | 0.054 |
| $T_4$ | 0.043 | 0.056 | 0.039 |
| $T_5$ | 0.045 | 0.054 | 0.035 |
| $T_6$ | 0.051 | 0.069 | 0.059 |
| SED<br>CD (p<0.05)<br>CD (p<0.01) | 0.01757<br>0.03547<br>0.04741** | | |

** - Significant at 1% (P<0.01) **DAS** - Days After Sowing

C- Absolute control
$T_1$- compost 1 (Raw corncob composted by using *Pleurotus sajor-caju* (5t $ha^{-1}$))
$T_2$- compost 2 (Predigested raw corncob + *Eudrilus eugeniae* (5t $ha^{-1}$))

 

$T_3$- compost 3 (Raw corncob predigested by using *Pleurotus sajor-caju* and *Eudrilus eugeniae* (5t $ha^{-1}$))
$T_4$- compost 4 (Raw coirpith composted by using *Pleurotus sajor-caju* (5t $ha^{-1}$))
$T_5$- compost 5 (Predigested raw coirpith + *Eudrilus eugeniae* (5t $ha^{-1}$))
$T_6$- compost 6 (Raw coirpith predigested by using *Pleurotus sajor-caju* and *Eudrilus eugeniae* (5t $ha^{-1}$)).

**TABLE 2**

**EFFECT OF BIOCOMPOSTED CORNCOB AND COIRPITH ON LEGHAEMOGLOBIN CONTENT IN NODULES OF VIGNA ACONITIFOLIA (Jacq.) Marechal**

| Treatments | Leghaemoglobin Content (mg/g nodule weight) | | |
|---|---|---|---|
| | 25DAS | 50DAS | 75DAS |
| C | 0.016 | 0.024 | 0.018 |
| $T_1$ | 0.020 | 0.028 | 0.021 |
| $T_2$ | 0.031 | 0.040 | 0.033 |
| $T_3$ | 0.043 | 0.052 | 0.046 |
| $T_4$ | 0.037 | 0.050 | 0.040 |
| $T_5$ | 0.035 | 0.049 | 0.041 |
| $T_6$ | 0.048 | 0.057 | 0.049 |
| SED<br>CD (p<0.05)<br>CD (p<0.01) | 0.00574<br>0.01159<br>0.01550** | | |

** - Significant at 1% (P<0.01) **DAS** - Days After Sowing

C- Absolute control
$T_1$- compost 1 (Raw corncob composted by using *Pleurotus sajor-caju* (5t $ha^{-1}$))ss
$T_2$- compost 2 (Predigested raw corncob + *Eudrilus eugeniae* (5t $ha^{-1}$))
$T_3$- compost 3 (Raw corncob predigested by using *Pleurotus sajor-caju* and *Eudrilus eugeniae* (5t $ha^{-1}$))
$T_4$- compost 4 (Raw coirpith composted by using *Pleurotus sajor-caju* (5t $ha^{-1}$))
$T_5$- compost 5 (Predigested raw coirpith + *Eudrilus eugeniae* (5t $ha^{-1}$))
$T_6$- compost 6 (Raw coirpith predigested by using *Pleurotus sajor-caju* and *Eudrilus eugeniae* (5t $ha^{-1}$)).

 