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Research Article

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## Effect of Modified Panchagavyam on Growth of *Vigna radiata*- A Biochemical Approach

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**Abstract:** Organic farming has developed very rapidly in recent years and has gained importance in maintaining the dynamic soil nutrient. The present study was aimed to investigate the effect of a modified panchagavyam on the physical and biochemical parameters of *Vigna radiata*. The results of the study revealed that there was an optimal increase in physical parameters (13% increase in shoot and 22% increase in root length). The biochemical parameters (29% carbohydrate, 71% reducing sugar, 49% free aminoacids, 71 % chlorophyll, 23% carotenoids) were also found to be increased. The enzymic and non enzymic antioxidants (45% phenols, 36% tannins, 23% of flavonoids, 23% steroids, 29% catalase and 23% GST) were also noticed to be remarkably increased when compared with that of control and urea treated plants.

**Keywords:** organic fertiliser, modified panchagavyam, *Vigna radiata*, biochemical parameters.

### INTRODUCTION

Organic farming is a holistic production system which serves as a alternative to conventional food products and are ensured to be as safe food for human consumption. Panchagavya is an organic

formulation which is used as a foliar application to enhance the biological efficacy of crop plants for farmers. It requires mainly five products obtained from cow i.e. cow milk, cow ghee, cow curd, cow dung and cow urine<sup>1</sup>. All these products are individually called as “Gavya” and are collectively referred to as panchagavya. The ingredients present in it helps to improve soil fertility and promotes the growth and yield of the crop in terms of both productivity and quality of product and also enhances the insecticidal activity of panchagavya<sup>2</sup>. *Vigna radiata* commonly known as mung bean is a crop that is widely grown in India and are known for its short growth period. It is one of the most important pulse crop for protein supplement in subtropical zones of the world. The physical parameters, (root and shoot length) biochemical parameters, (protein, carbohydrate, reducing sugar, free amino acids, chlorophyll, carotenoids) enzymic antioxidants, (Catalase and Glutathione-S-transferase) and non enzymic antioxidants (phenols, tannins, flavonoids and steroids) accounts for the knowledge of quantity and quality aspects of the plant. The current research work was focused to ensure the effect of foliar application of the modified formulation of panchagavya which is prepared using the excreta of cow (cow dung and cow urine) along with dry neem leaves and jaggery on different physical and biochemical parameters on *Vigna radiata*.

## MATERIALS AND METHODS

**Collection of seeds and soil:** The seeds of *Vigna radiata* (mung bean) were collected from Udumalpet, Thirupur district, Tamil Nadu, India and authenticated by Botanical Survey of India, TNAU, Thiruppur district, Tamil Nadu, India. Bedding for the plants was obtained from Marudhamalai, Coimbatore.

**Plant cultivation and grouping:** The seeds were sowed in twelve pots, where four pots were allotted for control and four pots for urea and four pots for test respectively. The control was grown without any fertilizer and the next four pots were grown using urea in which urea was introduced along with the soil for all pots and remaining four test was grown using modified panchagavyam. The modified panchagavyam was poured to the plants at a daily course instead of water.

**Preparation of modified panchagavyam:** About 1 litre of cow dung, 1 litre of cow urine and 50g of jaggery was dissolved in 10 litres of water. The Mixture was left for 3 days and for every 10 hrs interval the mixture was mixed 12 times clockwise and anti-clockwise alternatively. After 3 days, dry neem leafs were added to the mixture and left for 3 more days followed by mixing as mentioned above.

**Physical parameters:** The shoot length of the three groups of plant was measured every 7 days interval till 28 days and the root length was measured at the 28<sup>th</sup> day.

**Biochemical parameters:** Estimation of protein, carbohydrate, reducing sugar, free aminoacids, chlorophyll, carotenoids, phenols, tannins, flavonoids and antioxidants like steroids, Catalase and Glutathione-S-transferase were done on *Vigna radiata* leafs using standard methods.<sup>3-9</sup>

## RESULTS AND DISCUSSION

The results of physical parameters are represented in Table 1. Table 1 reveals that the shoot length of the *Vigna radiata* plant treated with the modified panchagavya (group III) was found to be increased when compared to that of urea and control (group II and I respectively). Table1 also proves that the root length in group III was noticed to be lengthy in comparison with group II and I. The increase in group III might be due to the microbial population in panchagavya that secretes phytohormones which enhance the plant growth<sup>10,11</sup>.

**Table 1:** Shoot and root lengths measured at various days

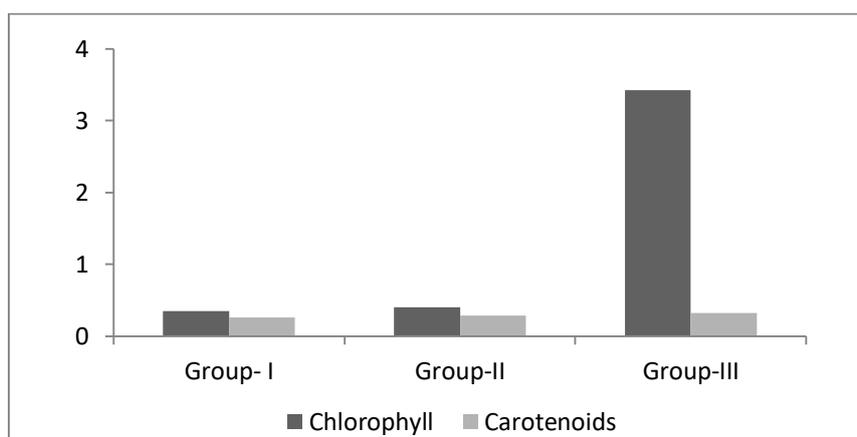
| Groups<br>Days | Shoot length (cm)   |                     |                      |                      | Root length (cm)     |
|----------------|---------------------|---------------------|----------------------|----------------------|----------------------|
|                | 1 <sup>st</sup> day | 7 <sup>th</sup> day | 14 <sup>th</sup> day | 28 <sup>th</sup> day | 28 <sup>th</sup> day |
| Group I        | 3.0                 | 9.0                 | 11                   | 23                   | 4.5                  |
| Group II       | 3.4                 | 12                  | 20                   | 24                   | 4.7                  |
| Group III      | 4.0                 | 13                  | 21                   | 26                   | 5.5                  |

The results of biochemical contents (protein, carbohydrate, reducing sugars and free amino acids) on spraying with modified panchagavya for different days are tabulated in Table 2. The plants treated with the modified panchagavya (group III) recorded increase in protein, carbohydrate, reducing sugar and free amino acid content when compared with that of urea treated (group II) and control plants (group I).

**Table 2:** Quantitative analysis of protein, carbohydrate, reducing sugar and free amino acids

| Groups | Protein (mg/g) | Carbohydrate (mg/g) | Reducing Sugars (mg/g) | Free amino acids (mg/g) |
|--------|----------------|---------------------|------------------------|-------------------------|
| I      | 5.05±1.91      | 2.32±0.12           | 2.00±1.15              | 2.23±0.21               |
| II     | 5.93±0.16      | 2.45±0.90           | 2.78±0.12              | 3.10±0.24               |
| III    | 6.02±1.91      | 3.00±0.90           | 3.43±0.12              | 3.33±0.24               |

Photosynthetic pigments such as chlorophylls and carotenoids are depicted in Fig.1. The amount of chlorophyll and carotenoids optimally increased in plants treated with modified panchagavya (group III) when compared with that of urea treated (group II) and control plants (group I).

**Figure 1:** Quantitative analysis of chlorophyll and carotenoids

Antioxidants like phenols, flavonoids, tannins, steroids and antioxidant enzymes like catalase and GST were estimated and the results are depicted in Table 3. It was found that the levels of antioxidants (phenols, flavonoids, tannins and steroids) and antioxidant enzymes (catalase and GST) were elevated in plants treated with modified panchagavya (group III) than in urea treated and control plants (group II and group I).

**Table 3:** Quantitative analysis of phenols, flavonoids, tannins, steroids, catalase and GST

| Groups | Phenol<br>(mg/g) | Flavanoid<br>(mg/g) | Tannins<br>(mg/g) | Steroids<br>(mg/g) | Catalase<br>(mg/g) | GST<br>(mg/g) |
|--------|------------------|---------------------|-------------------|--------------------|--------------------|---------------|
| I      | 5.01±0.04        | 1±0.08              | 2.3±0.1           | 1±0.08             | 1.7±0.02           | 0.21±0.08     |
| II     | 6.80±0.01        | 1.3±0.2             | 1.2±0.2           | 1.5±0.2            | 2.0±0.1            | 0.24±0.09     |
| III    | 7.01±0.01        | 1.5±0.2             | 3.0±0.2           | 1.5±0.2            | 2.2±0.1            | 0.26±0.09     |

The plant showed increased trend in biochemical contents. The highest biochemical content was recorded in plants treated with modified panchagavyam (group III) when compare to plants treated with urea (group II) and control (group I). Simlilar results were observed in different plants like *Abelmochus esculentus*, *Oryza sativa*, *Zea mays* and *Vigna mungo* that were treated with panchagavya.<sup>12-15</sup>

## CONCLUSION

The present study can be inferred that the modified panchagavyam had a maximum effect on the morphological and biochemical attributes of *Vigna radiata* and might play a significant role in organic agricultural development. The increase in the above mentioned parameters implies that the modified panchagavya is a suitable organic fertilizer which could help to improve the productivity and nutritional quality of the plant and hence can be preferred by any organic farmer.

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