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# Productivity and economy escalation of rice- fallow blackgram (*cv: Vamban 2*) as influenced by the foliar application of organics

**T Geetha Jebarathnam Kuttibai[1], Prakash V[2], M S Bhagavathi[3], S Udhaya Bharathi[4], G Mohanraj[4]**

[1] Professor and Head, School of Agriculture, Bharath Institute of Higher Education and Research, Selaiyur, Chennai, Tamil Nadu, India

[2] Associate Professor, School of Agriculture, Bharath Institute of Higher Education and Research, Selaiyur, Chennai, Tamil Nadu, India

[3] Assistant Professor, School of Agriculture, Bharath Institute of Higher Education and Research, Selaiyur, Chennai, Tamil Nadu, India

[4] Research Scholar, Faculty of Agriculture, Annamalai University, Tamil Nadu, India

**Abstract**
Field experiment was conducted at the Experimental farm, Department of Agronomy, Bharath Institute of Higher Education and Research, School of Agriculture, Selaiyur, Chennai, to study the effect of foliar spray of organic phytohormones on rice fallow black gram, during April, 2022. All the treatments significantly influenced the growth and yield characters of black gram. Among the treatments, $T_6$- foliar spray of 5% panchakavya with 10% vermiwash at 30and 45 DAS recorded higher seed yield 974 kg $ha^{-1}$, haulm yield 2360 kg $ha^{-1}$, harvest index (29.23) and BCR (2.20). $T_1$ – control treatment, wherein no phytohormones were used recorded the least seed yield, haulm yield, harvest index and BCR.

**Keywords:** seed yield, haulm yield, harvest index and BCR

## Introduction

In recent years, organic farming has gained momentum due to the realization of its inherent benefits in sustaining crop production, maintaining dynamic soil nutrient status and a safe environment (Lokanath and Parameshwarappa, 2006) [4]. Black gram, as a pulse crop widely grown as a grain legume crop belongs to family *Fabaceae* and derives considerable importance from food to nutritional security. Among the entire yield regulating factors of crop production, nutrient management and pest management are essential to ensure the optimum yield and production, as pulse crops are often raised, utilizing the residual nutrient status. Moreover, the application of nutrients to the soil is often insufficient, since crops like black gram are associated with instability in flowering and fruiting habit, there is constant competition for availability of coordinates between vegetative stage and reproductive sinks throughout the growth period. First, the source is highly limited by reducing the transfer of photosynthates to growing reproductive parts. Therefore, leaf area is an important growth parameter for obtaining high root coherence production, which is also determined by the light interference which is an important weather parameter for the determination of plant productivity. Apart from this, major physiological limitations are flower and fruit drop (Ojeaga O.O, Ojehomon, 1972) [6]. Moreover, it is also cultivated in rainfed land, soil application of fertilizers are not effective at the right time and in the right amount due to soil moisture deficit, hence applied through foliar spray for efficient absorption. While foliar spray is not a substitute for soil application, it certainly is considered as a supplement, due to non-availability of soluble fertilizers.

(Upadhyay *et al.*, 1992) [10]. In many cases aerial application of nutrient spray is more preferred as it gives faster and better results than soil application (Jamal *et al.*, 2006) [2]. In black gram, foliar application of nutrient and plant growth regulator at pre-flowering stages and flowering stages resulted in decreased flower drop percentage (Ganapathy *et al.*, 2008) [1]. Foliar nutrition is recognized as an important alternate fertilization technique, because the supply of nutrients in leaves usually penetrate the leaf cuticle or stomata and enter into the cells easily and reach site of action at a faster rate. It has an advantage of velocious and efficient application of nutrients, ensuring fixation and absorption of nutrients through foliage. (Manonmani and Srimathi, 2009) [5].

Foliar application is the method to regulate the growth of the plant at critical phases. This method is one of the latest trends in agriculture, to play a significant role in development, physiology and productivity crop. (Sharma *et al.*, 2013) [9]. Vermiwash, panchakavya and jeevamruth, protects the environment, control the hazardous effect of chemicals and ultimately builds soil fertility. Vermiwash, the extract body fluid of earthworms is also nutrient rich with growth promoting components (Vennila and Jayanthi, 2008) [11].

## Materials and Methods

Field experiment was conducted at the Experimental farm, Department of Agronomy, Bharath Institute of Higher Education and Research, School of Agriculture, Selaiyur, Chennai. The weather of Selaiyur is moderately warm with hot summer months. While the maximum temperature ranges from 27.8 °C | 82.1 °F with an average temperature of 31.4 °C | 88.5 °F, May is the hottest month of the year, recording an average temperature at 24.1 °C | 75.4 °F, likewise January is the coldest month of the year.

The experiment was laid out in Randomized Block Design (RBD) with three replications and seven treatments. The fertilizers was applied to the experimental field as per the recommended manurial schedule of 25:50:25 and 20 kg of N:P:K and S kg/ha Urea (46% N). Di ammonium phosphate (60% N) and (46% $P_2O_5$) and Muriate of potash (60% $K_2O$) fertilizers were used to supply N, P and K nutrients respectively. Full dose of nitrogen were applied as two splits on 30 and 45 days after sowing.. According to the treatment schedule the prescribed quantities of the above foliar spray of 3% and 5% panchakavya (Fig.1), Foliar spray of 10% jeevamruth (Fig.2), foliar spray of 10% vermiwash (Fig.3), foliar spray of 10% cow urine at 30 and 45 DAS traced for its effectiveness at varying combinations as given below:

**Table 1:** Treatment details

| | |
|---|---|
| **$T_1$ -** | **Water spray (Control)** |
| $T_2$ - | Foliar spray of 3% panchakavya at 30 and 45 DAS |
| $T_3$ - | Foliar spray of 10% jeevamruth at 30 and 45 DAS |
| $T_4$ - | Foliar Spray at 10% Vermiwash 30 and 45 DAS |
| $T_5$ - | Foliar Spray of 10% cow urine at 30 and 45 DAS |
| $T_6$ - | Foliar spray of 5% panchakavya at 10% vermiwash at 30 and 45 DAS |
| $T_7$ - | Foliar spray of 5% panchagavya +10% cow urine at 30 and 45 DAS |

## Results and Discussion

### Yield (Table -2)

### Seed yield (kg ha$^{-1}$)

Among the treatments, foliar spray of 5% panchakavya and 10% vermi wash at 30 and 45 DAS ($T_6$), significantly registered higher seed yields (Fig. 4) of 974 kg ha$^{-1}$. The results were in concurrence with Rekha *et al* (2013) because higher trends in growth and yield parameters were observed in black gram as a result of vermiwash spray. This was followed by $T_7$ - foliar spray of 5% panchkavya + 10 % cow urine at 30 and 45 DAS. The other treatments *viz., (*$T_4$) foliar spray of 10% vermi wash at 30 and 45 DAS was on par with ($T_5$) foliar spray of 10% cow urine at 30 and 45 DAS but, ($T_2$) foliar spray of 3% panchakavya at 30 and 45 DAS was on par with ($T_3$) foliar spray of 10% jeevamruth at 30 and 45 DAS. The least seed yield of 450 kg ha$^{-1}$ was recorded in the water spray ($T_1$). This might be due to the complementary effect of panchakavya and vermi wash that had been effective at an early stage. As it is absorbed and translocated to the pods and obtained more yield (Kumawat *et al*. 2009) [3].

### Haulm yield (kg ha$^{-1}$)

Among the treatments, highest haulm yield (Fig. 4) was recorded in ($T_6$) foliar spray of 5% panchakavya at 10% vermi wash 2360 kg ha$^{-1}$ at 30 and 45 DAS and followed by the treatment, ($T_7$) foliar spray of 5% +10% cow urine at 30 and 45 DAS. The other treatment *viz.*, foliar spray at 10% Vermi wash 30 and 45 DAS ($T_4$) on par with ($T_5$) foliar spray of 10% cow urine at 30 and 45 DAS and Foliar spray of 3% panchakavya at 30 and 45 DAS ($T_2$) was on par with foliar spray of 10% jeevamruth at 30 and 45 DAS ($T_3$). The least haulm yield of 1795 kg ha$^{-1}$ was recorded in the control ($T_1$). This may be due to the availability of macro and micro nutrients in panchakavya and vermiwash that better developed the crop growth and eventually yield enhancing attributes, yield and obtain more haulm yield as reported by Sanjutha *et al.* (2008) [8].

### Harvest index

The observations on harvest index computed for all the treatments tried in this field experiment is furnished in Table:1. There was no significant difference among the treatments in influencing the harvest index of rice fallow black gram.

### Economics (Table - 3)

### Net Income and Benefit Cost Ratio (BCR)

The treatment $T_6$ - foliar spray of 5% panchakavya at 10% vermiwash significantly registered the highest net income (Rs 24,529/-) and benefit cost ratio (BCR) of 2.20. The lowest net income (Rs 998/-) and Benefit Cost Ratio (BCR) invested 1.05 was obtained with the treatment water spray ($T_1$). The cost incurred for liquid organics is comparatively appreciable, hence the impact on economics is prominent through this treatment is exclusively better. Hence the benefit- cost ratio is higher in 5% panchakavya and 10% vermi wash because of lower cost of inputs used when compared to the other treatments and hence the bumper yield. The results are in confirmation as reported by Prabhu *et al.* (2010) [7].

## Conclusion

To conclude, black gram productivity is not enough to meet domestic demand in the growing Indian population. Thus, it is essential to improve productivity of black gram through proper agricultural practices. Foliar feeding acts as a possible approach to the exploitation of hormones that offers genetic potential for growth and development of black gram. On the basis of the field experiment, it may be inferred that the application of ($T_6$) foliar spray of 5% panchakavya and 10% vermiwash had a remarkable effect on the yield and economics of Black gram. It is an effective practice for enhancing the black gram yield.

In developing country like, India solid and liquid organic fertilizers used by farmers contain higher mineral and nutrient content, perhaps, foliar nutrition is simple, inexpensive practice that favoured morphological, physiological and biochemical characters for better yield and quality performance in the present study. Hence it is concluded that for obtaining higher seed yield and profitability foliar spray of 5% panchakavya with 10% vermiwash at 30 and 45 DAS had promoted higher growth and yield returns. This need to be explored as effective foliar spray for better performance of other field crops in the near future.

**Table 2:** Effect of organic foliar spray on yield parameters of black gram

| Treatments | Seed yield (kg ha$^{-1}$) | Haulm yield (kg ha$^{-1}$) | Harvest index |
|---|---|---|---|
| $T_1$ - Water spray | 450 | 1795 | 20.04 |
| $T_2$ - Foliar spray of 3% Panchakavya at 30 and 45 DAS | 558 | 1927 | 22.44 |
| $T_3$ - Foliar spray of 10% jeevamruth at 30 and 45 DAS | 542 | 1893 | 22.27 |
| $T_4$ - Foliar Spray at 10% vermiwash 30 and 45 DAS | 678 | 2119 | 24.23 |
| $T_5$ - Foliar Spray of 10% Cow urine at 30 and 45 DAS | 665 | 2092 | 24.13 |
| $T_6$ - Foliar spray of 5% Panchakavya + 10% vermi wash at 30and 45 DAS | 974 | 2360 | 29.23 |
| $T_7$ - Foliar spray of 5% +10% Cow urine at 30 and 45 DAS | 857 | 2230 | 27.76 |
| S.Ed | 41.18 | 50.6 | NS |
| CD ($P$ = 0.05) | 89.35 | 109.85 | NS |

**Table 3:** Effect of organic foliar spray on the economics of black gram

| Treatments | Cost of Cultivation (Rs./ha) | Gross income (Rs./ha) | Net income (Rs./ha) | BCR |
|---|---|---|---|---|
| $T_1$ - water spray | 20142 | 21140 | 998 | 1.05 |
| $T_2$ - Foliar spray of 3% panchakavya at 30 and 45 DAS | 20262 | 26058 | 5796 | 1.29 |
| $T_3$ - Foliar spray of 10% jeevamruth at 30 and 45 DAS | 20282 | 25354 | 5072 | 1.25 |
| $T_4$ - Foliar Spray at 10% vermiwash 30 and 45 DAS | 20382 | 31554 | 11172 | 1.55 |
| $T_5$ - Foliar Spray of 10% cow urine at 30 and 45 DAS | 20227 | 30987 | 10760 | 1.53 |
| $T_6$ - Foliar spray of 5% panchakavya + 10% vermi wash at 30and 45 DAS | 20502 | 45031 | 24529 | 2.20 |
| $T_7$ - foliar spray of 5% +10% cow urine at 30 and 45 DAS | 20347 | 39674 | 19327 | 1.95 |


**Fig 1:** Panchagavya


**Fig 2:** Jeevamruth

**Fig 3:** Vermiwash

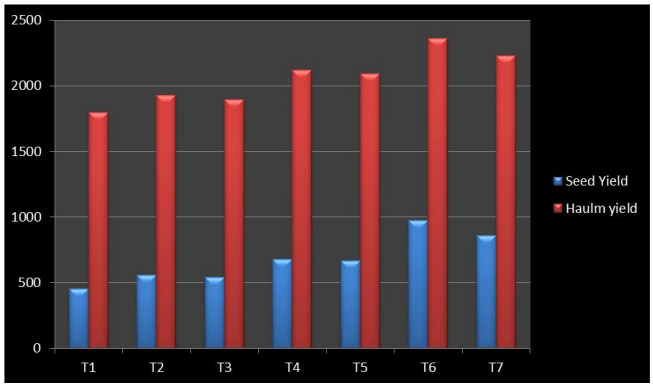


**Fig 4:** Seed yield and Haulm yield

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