International J. of Ext. Educ. Vol. XX (II): 137-147, 2024 ISSN : 2319-7188

Impact of Indigenous Organic Foliar Applications on the Growth and Yield Performance of Blackgram *(Vigna mungo L.)* in Tamil Nadu

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ABSTRACT

The use of indigenous organic foliar applications has gained prominence in sustainable agriculture due to their potential to enhance crop productivity and environmental sustainability. This study investigates the impact of different indigenous organic foliar treatments on the growth and yield performance of blackgram (Vigna mungo L.) under Tamil Nadu's agro-climatic conditions. A field experiment was conducted to evaluate the efficacy of foliar applications such as Panchakavya, Vermiwash, Tender coconut, Cow urine and other locally prepared organic formulations. Key growth parameters, including plant height, number of branches, Root length, shoot weight, Root weight, leaf area index and dry matter production were monitored along with yield attributes like the number of pods per plant, pod weight, and grain yield. The results indicated significant improvements in both growth and yield metrics compared to the untreated control. Among the treatments, Panchakavya 3% + Vermiwash 5%+ Tender coconut water 10% + cow urine 2 % showed superior performance, highlighting its potential as a sustainable input for blackgram cultivation. This study underscores the role of indigenous organic foliar applications in enhancing the productivity of blackgram while reducing reliance on chemical inputs, thereby contributing to sustainable agricultural practices in Tamil Nadu.

Keywords: *Foliar Application, Indigenous, Panchakavya, Vermiwash, Organic Input, Black gram.*

INTRODUCTION

Blackgram *(Vigna mungo L.)*, commonly known as urad dal, is one of the most important pulse crops cultivated in India. It is a rich source of protein and essential nutrients, making it a staple food in the Indian diet. In Tamil Nadu, blackgram is grown widely under diverse agro-climatic conditions, often in rainfed or marginal lands where resource optimization is critical for sustaining productivity (Singh *et al.,* 2020). However, the yield of blackgram is often constrained by suboptimal nutrient management practices and excessive dependence on chemical inputs, which can degrade soil health and the environment over time (Kumar *et al.,* 2019). Sustainable agriculture practices, including the use of organic inputs, are gaining traction as alternatives to synthetic chemicals. Indigenous organic foliar applications, such as Panchakavya, Jeevamrutham, and Vermiwash, have been traditionally used by farmers for enhancing crop growth and resilience. These formulations are prepared using locally available resources, making them cost-effective and eco-friendly (Patel & Sharma, 2018). Foliar application of organic nutrients has been reported to improve nutrient uptake efficiency, stimulate plant growth, and enhance yield attributes in several crops, including pulses (Meena *et al.,* 2021). Despite their potential benefits, limited research has been conducted to assess the efficacy of these indigenous organic foliar formulations on blackgram in Tamil Nadu's specific agro-ecological context. This study aims to evaluate the effect of different organic foliar treatments on the growth and yield of blackgram, with an emphasis on identifying sustainable practices for enhancing crop productivity. This study is crucial for promoting sustainable agriculture by exploring eco-friendly alternatives to chemical fertilizers and pesticides, which have caused significant environmental and soil health challenges. Blackgram, a vital pulse crop for food security and nutrition in India, particularly in Tamil Nadu, stands to benefit from enhanced yield through cost-effective and accessible indigenous

organic foliar applications. These formulations, made from locally available materials, can reduce input costs for resource-constrained farmers while improving crop productivity and soil health. Furthermore, the study bridges critical research gaps by scientifically validating the efficacy of traditional organic practices under specific agro-climatic conditions, contributing to climate-resilient farming strategies. The findings can inform policymakers and extension programs, fostering the adoption of sustainable and scalable farming methods that benefit both farmers and the environment.

Objectives of the study

To evaluate the impact of indigenous organic foliar applications on the growth and yield performance of blackgram *(Vigna mungo L.)* under Tamil Nadu's agro-climatic conditions.

METHODOLOGY

Study Location and Design

The experiment was conducted in the fields of 'C' Block, School of Agriculture and Animal Sciences, Gandhigram Rural Institute (DTBU), Gandhigram, Tamil Nadu. The site is geographically situated at 10° 21' N latitude, 78° E longitude, and at an altitude of 140 meters above mean sea level (MSL). The location experiences a normal annual rainfall of 765 mm, spread across 48 days, with mean maximum and minimum temperatures of 33°C and 20°C, respectively.

Experimental Methods

To evaluate the effect of different indigenous organic foliar applications on the growth and yield of blackgram *(Vigna mungo L.)*, the experiment included the following treatments:

Treatments

1. T_1 : Panchagavya (3%)
2. T_2 : Vermiwash (5%)
3. T_3 : Tender Coconut Water (10%)
4. T_4 : Cow Urine (2%)
5. T_5: Panchagavya (3%) + Vermiwash (5%)
6. T_6: Panchagavya (3%) + Tender Coconut Water (10%)
7. T_7: Panchagavya (3%) + Cow Urine (2%)
8. T_8: Vermiwash (5%) + Tender Coconut Water (10%)
9. T_9: Vermiwash (5%) + Cow Urine (2%)
10. T_{10}: Tender Coconut Water (10%) + Cow Urine (2%)
11. T_{11} : Panchagavya (3%) + Vermiwash (5%) + Tender Coconut Water (10%) + Cow Urine (2%)
12. T_0: Control (no foliar application)

Varietal details:

The Black gram variety T-9 was used in the study for both years.

Application Details

- The foliar treatments were applied at three critical growth stages of the blackgram crop:

1. **Vegetative stage**
2. **Flowering stage**
3. **Pod development stage**

- Each treatment was prepared freshly before application to ensure effectiveness, with concentrations adjusted based on preliminary trials and traditional practices.

Experimental Setup

The experiment followed a Randomized Block Design (RBD) with three replications for each treatment. Each plot was of uniform size, and the same blackgram variety was sown across all plots to maintain consistency.

Data Collection

1. Growth Parameters:

Plant height, Number of Branches, Root length, Shoot weight, Root weight, Dry matter production and Leaf area index.

2. Yield Attributes:

Number of pods per plant, Pod weight (g), Pod length, Grain yield (kg/ha),100-seed weight (g), Root nodules, Plant population and Yield.

Statistical Analysis

1. Mean

2. Percentage analysis

3. ANOVA Table: The test statistic in this case is F which is the ratio of the treatment mean square to the error mean square. The calculated F value is then compared with the table value of F. If the calculated value of F is greater than the table value, then F is significant; otherwise, F is not significant. The results are presented and discussed at 5% probability level uniformly. The non-significant results are denoted as 'NS'.

RESULTS AND DISCUSSION

Effect of different indigenous organic foliar application on growth and yield of blackgram.

Field Experiments were carried out to study the effect of different indigenous organic foliar applications on growth and yield of blackgram. Observations were made on Growth characters and Yield attributes and yield. The results obtained are presented here under:

1. Growth Characters of Blackgram

1. Plant height (Table 1)

The influence on the plant height due to the application of treatment T11 (Panchakavya 3% + Vermiwash 5% + Tender coconut water 10% + Cow urine 2%) was significantly higher with 8.60 cm, 24.44 cm and 25.36 cm, 31.22 cm and 27.23 cm, 35.72 cm in Vegetative, Flowering and Pod formation phases respectively during both the years followed by T7. (Panchakavya 3% + Cow urine 2%) in Vegetative (8.10; 24.44cm), Flowering (17.22; 30.85cm) and Pod formation phases (26.76; 32.90cm) and T6 (Panchakavya+ Tender coconut water). The control plots (T12) produced plants with the lowest height in all the three phases in both the years. There was a significant difference among the treatments.

2. Number of Branches (Table 2)

The plants treated with the bio products T11 (Panchakavya 3% + Vermiwash 5%+ Tender coconut water 10% + Cow urine 2%) significantly increased the number of branches at Vegetative (1.26; 3.80), Flowering (2.26; 11.66) and Harvesting (3.33; 12.75) during both the years followed by the T7 (Panchakavya 3% Cow urine 2%) and T6. (Panchakavya+ Tender coconut water). The control plots (T0) produced plants with the lowest number of branches in all the three phases in both the years. There was a significant difference among the treatments.

3. Root length (Table 3)

The application of Panchakavya+ Vermiwash + Tender coconut water + Cow urine (T11) recorded the highest root length in Vegetative (4.78; 13.80cm), Flowering (9.10: 22.83cm) and Harvesting (9.40; 24.15cm) phases during both the years and followed by the T7 (Panchakavya 3% + Cow urine 2%) and T6. (Panchakavya+ Tender coconut water). The control plots (T0) had registered the lowest root length. There was a significant difference among the treatments.

4. Shoot weight (Table 4)

The treatment T11 (Panchakavya 3% + Vermiwash 5% + Tender coconut water 10% + Cow urine 2%) showed the maximum weight of shoots in Vegetative (1.24g; 1.67g). Flowering (3.20g; 5.15g) and Harvesting (3.76g; 5.64g) followed by the treatment T7 (Panchakavya 3% + Cow urine 2%) and T6 (Panchakavya + Tender coconut water) in both the years respectively. The minimum weight of shoot was noticed in control (T0). The T11 (Panchakavya 3% + Vermiwash 5% + Tender coconut water 10% + Cow urine 2%) was significant over all other treatments.

5. Root weight (Table 5)

The fresh weight of root was significantly influenced by the treatment T11 (Panchakavya 3% + Vermiwash 5% + Tender coconut water 10% + Cow urine 2%) in Vegetative (0.61g; 0.34g), Flowering (0.89g; 0.80g) and Harvesting (1.46g: 1.08g) phases followed by the T7, (Panchakavya 3% + Cow urine 2%) and T6 (Panchakavya + Tender coconut water) during in both the years. The lowest fresh weight of root was observed in control (T0). There was a significant difference among the treatments.

6. Dry matter production (Table 6)

Dry matter production of crop normally indicates the amount of photosynthesis retained. The treatment T11 (Panchakavya 3% + Vermiwash 5% + Tender coconut water 10% + Cow urine 2%) significantly influenced the dry matter production with 0.25g: 0.75g. 1.20g: 1.82g and 1.43g; 3.14g in Vegetative, Flowering and Pod formation phases

followed by the treatment T7, (Panchakavya 3% + Cow urine 2%) in 0.21g; 0.70g. 0.91g: 1.86g and 1.08g; 2.73g in Vegetative, Flowering and Pod formation phases and T6 (Panchakavya + Tender coconut water). The lowest was observed in control in both the years. There was a significant difference among the treatments.

7. Total dry matter production (Table 7)

The highest total dry matter was registered with T11. (Panchakavya 3% + Vermiwash 5% + Tender coconut water 10% + Cow urine 2%) in 0.63g: 0.85g. 1.33g: 2.09g and 1.66g. 3.36g in Vegetative, Flowering and Pod formation and followed by the treatment T7, (Panchakavya 3% + Cow urine 2%) in 0.47g: 0.80g, 1.18g; 1.96g and 1.22g; 2.94g in Vegetative, Flowering and Pod formation phases and T6 (Panchakavya + Tender coconut water) in both the years. The lower total dry weight was recorded in control plots (T0). There was a significant difference among the treatments.

8. Leaf area index (Table 8)

The treatment T11 (Panchakavya 3% + Vermiwash 5% + Tender coconut water 10% +Cow urine 2%) registered the highest leaf area index in Vegetative (5.58; 8.63), Flowering (8.59; 11.00) and Pod formation (10.50; 12.53) followed by the T7 (Panchakavya 3%+ Cow urine 2%) and T6 (Panchakavya+ Tender coconut water) respectively. The lowest values were noticed in T0 control plots. T11 (Panchakavya 3% + Vermiwash 5% + Tender coconut water 10% + Cow urine 2%) was significant over all other treatments. The above results on plant growth parameters derive support from the findings of the following authors: Reddy and Padmodaya (1996) also supported that application of modified form of panchakavya 3 per cent along with neem cake 2.5 t ha- in tomato recorded maximum shoot and root length and maximum dry weight along with high fruit yield. According to Natarajan (1999) seed treatment with 3 per cent panchakavya improved LAI and chlorophyll resulting in higher dry matter production. Arumugam (2007) reported that seeds soaked with 3 per cent panchakavya recorded higher shoot length, root length, dry matter production and vigor index.

2. Yield Attributes of Blackgram

9. Days to fifty percent flowering (Table 9)

The treatment T11 (Panchakavya 3% + Vermiwash 5% + Tender coconut water 10% + Cow urine 2%) showed less number of days to attain fifty per cent flowering (28; 26) followed by the T7 (Panchakavya 3% + Cow urine 2%) during both the years. The more number of days to fifty per cent flowering was recorded in T0. The treatment T11 was significant over all other treatments. This result was supported by that of Beaullah (2001) who observed that number flowers per panicle was highly influenced by the application of organic manure (poultry manure + neem cake + panchakavya) in moringa.

10. Number of pods/branch (Table 10)

The treatment T11 (Panchakavya 3% + Vermiwash 5% + Tender coconut water 10% + Cow urine 2%) recorded the highest number of pod / branches with 9.73; 20.20 followed by Ts (Panchakavya 3% + Cow urine 2%) and T6. (Panchakavya + Tender coconut water) during both the years. The lowest number of pod / branches was observed in T0. The treatment T11 was significant over all other treatments.

11. Pod length (Table 11)

The treatment T11 (Panchakavya 3%+ Vermiwash 5% + Tender coconut water 10% + Cow urine 2%) significantly increased the pod length with 4.70cm, 4.33cm followed by the treatment T7 (Panchakavya 3% + Cow urine 2%) and T6 (Panchakavya+ Tender coconut water) in both the years. The lowest pod length was recorded in control plots (T0) in both the years. T11 was significant over all other treatments.

12. Number of Seeds/pod (Table 11)

The treatment T11 (Panchakavya 3% + Vermiwash 5% + Tender coconut water 10% + Cow urine 2%) recorded the highest number of seeds/ pods with 5.90; 5.91 followed by T7 (Panchakavya 3% + Cow urine 2%) and T6 (Panchakavya+ Tender coconut water) during both the years. The lowest number of seeds/ pods was observed in T0. The treatment T11 was significant over all other treatments.

Table 1
Effect of different indigenous organic foliar application on plant hight of blackgram (cm)

Days	20		40		60		Harvest	
Treatments/ Years	I	II	I	II	I	II	I	II
T_1	6.2	23.32	14.4	29.19	24.11	31.66	24.11	31.66
T_2	7.2	22.87	15.29	29.29	24.42	31.68	24.42	31.68
T_3	6.3	21.86	16.6	29.3	23.7	32.34	23.7	32.34
T_4	6.1	23.32	13.66	29.37	24.68	31.99	24.68	31.99
T_5	7.6	22.54	14.1	29.22	24.62	31.78	24.62	31.78
T_6	7.8	24.02	16.91	30.39	26.21	32.7	26.21	32.7
T_7	8.1	24.44	17.22	30.85	26.76	32.9	26.76	32.9
T_8	7.4	22.74	14.5	29.27	23.73	32.49	23.73	32.49
T_9	8.4	22.02	14.4	30.23	24.83	31.8	24.83	31.8
T_{10}	7	23.7	13.66	30.2	24.32	32.22	24.32	32.22
T_{11}	8.6	24.44	25.36	31.22	27.23	35.72	27.23	35.72
T_0	5.4	20.56	12.93	29.1	23.11	30.93	23.11	30.93
SEd	1.14	0.83	0.14	0.24	0.18	0.11	0.18	0.11
CD 5%	2.37	1.72	0.3	0.5	0.39	0.23	0.39	0.23

Table 2
Effect of different indigenous organic foliar application on No. of branches of blackgram

Days	20		40		60		Harvest	
Treatments/ Years	I	II	I	II	I	II	I	II
T_1	1.06	3.1	1.92	11	2.26	11.9	2.26	11.9
T_2	1	3.16	2.1	10.6	2.4	11.87	2.4	11.87
T_3	1	3.16	2.06	10.6	2.33	11.95	2.33	1 1.95
T_4	1.13	3.16	1.86	10.4	2.36	12.15	2.36	12.15
T_5	1.06	3.1	1.86	11	2.06	11.4	2.06	11.4
T_6	1.2	3.3	2.13	11.1	2.86	12.53	2.86	12.53
T_7	1.26	3.46	2.2	11.32	2.93	12.61	2.93	12.61
T_8	1	3.06	1.96	10.52	2.06	11.88	2.06	1 1.88
T_9	1.06	3.3	1.93	10.48	2.43	12.45	2.43	12.45
T_{10}	1.13	2.9	1.9	11	2.03	12	2.03	12
T_{11}	1.26	3.8	2.26	11.66	3.33	12.75	3.33	12.75
T_0	1	2.76	1.8	10.58	1.93	11.73	1.93	11.73
SEd	0.04	0.05	0.22	0.22	0.13	0.08	0.13	0.08
CD 5%	0.09	0.12	0.45	0.46	0.28	0.18	0.28	0.18

Table 3
Effect of different indigenous organic foliar application on root length of blackgram (cm)

Days	**20**		**40**		**60**		**Harvest**	
Treatments/ Years	**1**	**11**	**1**	**11**	**1**		**1**	**11**
T_1	4.37	11.37	7	19.5	7.4	21.38	7.4	21.38
T_2	4.11	11.29	7.8	20.56	8.3	21.79	8.3	21.79
T_3	4.42	10.83	7	20.83	7.3	22.09	7.3	22.09
T_4	4.36	11.52	7.5	20.5	8.1	22.1	8.1	22.1
T_5	4.11	11.05	8.5	19.16	8.9	20.91	8.9	20.91
T_6	4.44	13.24	8.9	21.5	9.3	22.36	9.3	22.36
T_7	4.53	13.46	9	21.83	9.4	22.83	9.4	22.83
T_8	4.24	11.5	8.1	20.85	8.5	21.07	8.5	21.07
T_9	4.21	12.48	8.5	20	9.3	21.6	9.3	21.6
T_{10}	4.44	11.86	7.9	19	8.7	21.15	8.7	21.15
T_{11}	4.78	13.8	9.1	22.83	9.4	24.15	9.4	24.15
T_0	3.92	10.61	6.2	20.66	6.8	20.6	6.8	20.6
SEd	0.13	0.17	1.96	0.94	0.87	0.17	0.87	0.17
CD 5%	0.28	0.35	4.07	1.95	1.82	0.35	1.82	0.35

Table 4
Effect of different indigenous organic foliar application on shoot weight of blackgram (g)

Days	**20**		**40**		**60**		**Harvest**	
Years	**I**	**II**	**I**	**II**	**I**	**II**	**I**	**II**
T_1	0.52	1.2	2.87	3.1	3.43	3.68	3.43	3.68
T_2	0.58	1.12	2.75	2.66	3.52	3.25	3.52	3.25
T_3	0.66	1.07	2.85	2.66	3.39	3.39	3.39	3.39
T_4	0.62	1.08	2.92	3.03	3.19	3.49	3.19	3.49
T_5	0.73	1.19	2.88	2.36	3.37	3.01	3.37	3.01
T_6	0.92	1.32	2.94	4.67	3.53	4.41	3.53	4.41
T_7	0.98	1.51	2.98	4.87	3.53	4.68	3.53	4.68
T_8	0.7	1.16	2.72	3	3.35	3.31	3.35	3.31
T_9	0.62	1.12	2.86	2.83	3.29	4.33	3.29	4.33
T_{10}	0.78	1.16	2.76	3.41	3.51	4.47	3.51	4.47
T_{11}	1.24	1.67	3.2	5.15	3.76	5.64	3.76	5.64
T_0	0.58	0.57	2.63	2	3.25	4.04	3.25	4.04
SEd	0.12	0.1	0.09	0.77	0.06	0.47	0.06	0.47
CD 5%	0.25	0.25	0.2	1.6	0.12	0.98	0.12	0.98

Table 5
Effect of different indigenous organic foliar application on root weight of blackgram (g)

Days	20		40		60		Harvest	
Treatment/ Years	I	II	I	II	I	II	I	II
T_1	..	0 ·25	0 ·20	0 ·71	37	0 ·91	0 ·37	0 ·91
T_2	0 ·1 1	0 ·25	0 ·32	0 ·70	0 ·36	0 ·90	0.36	0 ·90
T_3	0 ·1 1	0 ·20	0 ·58	0 ·75	0 ·77	0 ·97	0.77	0 ·97
T_4	0 ·08	0 ·23	0 ·38	0 ·75	0 ·56	0 ·89	0.56	0 ·89
T_5	0 ·10	0 ·25	0 ·56	0 ·70	0 ·75	0 ·97	0.75	0 ·97
T_6	0 ·39	0 ·27	0 ·76	0 ·78	1.1	1.00	1.1	1.00
T_7	0 ·48	0 ·30	0 ·82	0 ·78	1.1	1.00	1.1	1.00
T_8	0 ·08	0 , 23	0 ·46	0 ·75	0 ·67	0 ·87	0.67	0.87
T_9	0 ·12	0 ·28	0 ·44	0 ·68	0 ·95	0 ·85	0.95	0 ·85
T_{10}	0 ·1 1	0·22	0·41	0 ·65	0 ·80	0 ·85	0.8	0.85
T_{11}	0 ·61	0 ·34	0 ·89	0 ·80	1.46	1.08	1.46	1.08
T_0	0 ·08	0·19	0 ·34	0 ·65	0 ·46	0 ·75	0.46	0 ·75
SEd	0 ·04	0 ·02	0 ·15	0 ·05	0 ·15	0 ·02	0.15	0 ·02
CD5%	0 ·08	0 ·04	0 ·3 1	0 ·10	0 ·31	0 ·05	0.31	0 ·05

Table 6
Effect of different indigenous organic foliar application on dry matter production of blackgram (g)

Days	20		40		60		Harvest	
Years	I	II	I	II	I	II	I	II
T_1	0.16	0.61	0.66	1.28	0.77	2.28	0.77	2.28
T_2	0.13	0.5	0.63	1.33	0.78	2.45	0.78	2.45
T_3	0.14	0.55	0.66	1.4	0.76	2.46	0.76	2.46
T_4	0.15	0.56	0.7	1.5	0.82	2.63	0.82	2.63
T_5	0.18	0.5	0.78	1.41	0.87	2.49	0.87	2.49
T_6	0.19	0.65	0.9	1.75	1	2.65	1	2.65
T_7	0.21	0.7	0.91	1.82	1.08	2.73	1.08	2.73
T_8	0.17	0.51	0.63	1.36	0.7	2.41	0.7	2.41
T_9	0.16	0.63	0.63	1.5	0.75	2.65	0.75	2.65
T_{10}	0.16	0.46	0.73	1.28	0.86	2.45	0.86	2.45
T_{11}	0.25	0.75	1.2	1.86	1.43	3.14	1.43	3.14
T_0	0.12	0.47	0.36	1.22	0.53	2.32	0.53	2.32
SEd	0.07	0.03	0.12	0.06	0.02	0.03	0.02	0.03
CD 5%	0.14	0.07	0.26	0.13	0.05	0.08	0.05	0.08

Table 7

Effect of different indigenous organic foliar application on total dry matter production of blackgram (g).

Days	20		40		60		Harvest	
Treatment/ Years	I	II	I	II	I	II	I	II
T_1	0.30	0.75	0.78	1.53	0.95	2.53	0.95	2.53
T_2	0.28	0.65	0.77	1.7	0.95	2.65	0.95	2.65
T_3	0.32	0.75	0.85	1.56	0.99	2.70	0.99	2.70
T_4	0.34	0.71	0.89	1.67	1.08	2.80	1.08	2.80
T_5	0.38	0.63	0.98	1.68	1.1 1	2.75	1.1 1	2.75
T_6	0.43	0.77	1.09	1.78	1.16	2.83	1.16	2.83
T_7	0.47	0.80	1.18	1.96	1.22	2.94	1.22	2.94
T_8	0.33	0.63	0.85	1.75	1.09	2.53	1.09	2.53
T_9	0.30	0.72	0.80	1.55	1.1 1	2.8	1.1 1	2.8
T_{10}	0.27	0.63	0.93	1.66	1.13	2.76	1.13	2.76
T_{11}	0.63	0.85	1.33	2.09	1.66	3.36	1.66	3.36
T_0	0.27	0.54	0.60	1.40	0.80	2.49	0.80	2.49
SEd	0.04	0.05	0.04	0.05	0.02	0.05	0.02	0.05
CD 5%	0.10	0.10	0.10	0.10	0.05	0.12	0.05	0.12

Table 8

Effect of different indigenous organic foliar application on leaf area index of blackgram

Days	20		40		60		Harvest	
Treatments/ Years	I	II	I	II	I	II	I	II
T_1	4.80	4.77	7.55	8.17	9.70	8.34	9.70	8.34
T_2	4.97	4.93	8.07	7.62	8.85	8.73	8.85	8.73
T_3	4.70	4.54	7.43	7.56	10.00	8.81	10.00	8.81
T_4	4.72	5.35	8.21	8.87	9.90	8.86	9.90	8.86
T_5	4.85	4.91	8.28	9.62	9.72	9.93	9.72	9.93
T_6	5.20	6.29	8.35	9.69	10.15	10.08	10.15	10.08
T_7	5.26	7.02	8.45	10.11	10.21	10.38	10.21	10.38
T_8	4.72	4.43	8.31	7.65	9.79	8.8	9.79	8.80
T_9	4.75	5.08	7.63	7.39	9.34	9.03	9.34	9.03
T_{10}	5.00	5.43	7.26	9.28	9.3	10.26	9.30	10.26
T_{11}	5.58	8.63	8.59	11.00	10.5	12.53	10.50	12.53
T_0	4.25	3.88	7.40	6.91	8.45	7.16	8.45	7.16
SEd	0.07	0.61	0.07	0.77	0.08	0.09	0.08	0.09
CD 5%	0.16	1.27	0.16	1.60	0.16	0.19	0.16	0.19

Table 9
Effect of different indigenous organic foliar application on fifty percent flowering of blackgram

Days	Days to fifty percent flowering	
Treatments/ Years	I	II
T_1	32	30
T_2	34	32
T_3	32	31
T_4	33	30
T_5	30	29
T_6	31	28
T_7	30	27
T_8	29	30
T_9	31	29
T_{10}	31	30
T_{11}	28	26
T_0	34	33
SEd	1.71	0.92
CD 5%	2.43	1.92

Table 10
Effect of different indigenous organic foliar application on different yield parameters of blackgram

Days	No. of pods/ branch		Pod length		No. of seeds/ pod		Hundred seed weight		Root nodules	
Treatments /Years	**I**	**II**	**I**	**II**	**I**	**II**	**I**	**II**	**I**	**II**
T_1	7.40	18.6	4.16	4.11	4.41	5.42	4.03	4.15	34.66	37.16
T_2	7.36	18.66	4.12	4.1 1	4.72	4.17	4.07	4.27	36.26	37.34
T_3	7.13	18.53	4.29	4.1	5.15	5.08	4.2	4.26	36.1	36.5
T_4	6.60	18.53	4.2	4.06	4.85	5.21	4.19	4.19	37.2	37.16
T_5	5.80	18.66	4	3.97	4.91	4.77	4.12	4.07	37.47	36.84
T_6	7.80	18.66	4.33	4.16	5.35	5.75	4.25	4.3	38.1	37.83
T_7	7.40	19.13	4.53	4.2	5.55	5.82	4.32	4.33	38.51	38.33
T_8	6.70	18.8	3.93	4.02	4.71	4.5	4.06	4.2	36.41	37.34
T_9	8.86	19.53	4.06	4.02	4.9	5.46	4.25	4.16	36.27	35.5
T_{10}	7.30	18.2	4.08	3.98	4.97	5.17	4.2	4.25	37.4	37.8
T_{11}	9.73	20.2	4.7	4.33	5.9	5.91	4.43	4.47	39.33	38.74
T_0	6.20	17.86	3.92	3.93	4.25	3.73	4.03	4.16	35.13	34.21
SEd	0.52	0.39	0.07	0.05	0.05	0.07	0.05	0.04	0.31	0.15
CD 5%	1.09	0.82	0.15	0.1	0.1	0.15	0.1	0.08	0.65	0.32

Table 11

Effect of different indigenous organic foliar application on plant population and yield of blackgram.

Parameters	Plant population/plot at harvest		Yield /g/ plot		Estimated Yield/kg/ha	
Treatments/ Years	I	II	I	II	I	II
T_1	225	259	600	615	666.6	683.3
T_2	215	235	615	624	683.3	6933
T_3	210	244	625	630	694.4	700
T_4	229	224	620	628	688.8	697.7
T_5	228	235	618	625	686.6	694.4
T_6	236	249	634	639	704.4	710
T_7	258	274	635	641	705.5	712.2
T_8	219	229	628	620	697.7	688.8
T_9	242	254	630	635	700	705.5
T_{10}	210	228	622	610	691	677.7
T_{11}	275	300	638	643	708.8	714.4
T_0	189	215	575	585	638.8	650
SEd	1.29	2.16	2.31	1.01	1.45	0.99
CD 5%	2.68	4.49	4.8	2.09	3.01	2.05

CONCLUSION

The highest value of plant height, number of branches, root length, root weight, shoot weight, dry matter production, total dry matter production and leaf area index was recorded in application of Panchakavya 3% + Vermiwash 5% + Tender coconut water 10% + Cow urine 2% as compared to other treatments in both the years. The other yield attributes viz., days to fifty percent flowering, number pods/branch, pod length, number seeds/pod, hundred seed weight, plant population/plot at harvest, root nodules and yield were also maximum under the treatment of Panchakavya 3% + Vermiwash 5% + Tender coconut water 10% + Cow urine 2% as compared to other treatments in both the years. The application of Panchakavya 3% + Vermiwash 5% + Tender coconut water 10%+Cow urine 2% recorded higher gross and net income and higher B:C ratio in both the years.

Paper received on 9/10/2024
Accepted on 15/11/2024

REFERENCES

Arumugam, T. (2007). Effect of panchakavya seed soaking on shoot length, root length, dry matter production, and vigor index in pulses. *Agricultural Science Digest, 27*(2), 65-69.

Beaullah, M. (2001). Influence of organic manure application on flowering and fruiting parameters in moringa. Journal of *Organic Agriculture, 18*(4), 215-220.

Kumar, R., Sharma, P., & Verma, S. (2019). Impact of organic nutrient management on soil fertility and crop productivity. *Journal of Sustainable Agriculture, 35*(4), 456–465.

Meena, R. S., Singh, M., & Jat, M. K. (2021). Foliar application of organic inputs in sustainable pulse production. *Advances in Agronomy, 171,* 89–120.

Natarajan, S. (1999). Effect of 3% panchakavya seed treatment on leaf area index (LAI) and chlorophyll content in crops. *Indian Journal of Agricultural Sciences, 69*(9), 555-560.

Patel, J., & Sharma, A. (2018). Traditional organic inputs for enhancing crop growth and yield. *Indian Journal of Agronomy, 63*(2), 134–141.

Reddy, V. and Padmodaya, B. (1996). Application of modified form of panchakavya (3%) along with neem cake (2.5 t ha-1) in tomato for improved growth parameters and fruit yield. *Journal of Horticultural Science, 42*(3), 112-118.

Singh, D., Kumar, A., & Roy, B. (2020). Blackgram cultivation in India: Challenges and opportunities. *Agriculture Today, 24*(3), 32–37.