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Pre- Sowing Seed Treatment with Panchagavya, Beejamruth and Leaf Extract of Moringa and Neem on Growth, Yield and Yield Attributing Traits of Cowpea (*Vigna unguiculata* L.) cv-Bali265

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The present experiment entitled Pre-Sowing Seed Treatment with Panchagavya,Beejamruth and Leaf Extract of Moringa and Neem on Growth, Yield and Yield Attributing Characters of Cowpea (*Vigna unguiculata* L.) cv-Bali265. with the aim to identify better pre-sowing treatment for cowpea. During *Kharif*, 2021, present trail was carried out at the field experimentation center of the Genetics and Plant Breeding, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad. It has 13 priming treatments including Control on Cowpea seeds variety were used to study under field conditions. Field experiment was laid out in Randomized Block Design (RBD) with three replications respectively. T_0- Control, T_1 Moringa Leaves Extract 2% (8 hrs), T_2 Moringa Leaves Extract 4% (8 hrs), T_3 Moringa Leaves Extract 6% (8 hrs), T_4 Neem Leaves Extract 2% (8 hrs), T_5 Neem Leaves Extract 4% (8 hrs), T_6 Neem Leaves Extract 6% (8 hrs), T_7 Panchagavya 2% (8 hrs), T_8 Panchagavya 4% (8 hrs), T_9 Panchagavya 6% (8 hrs), T_{10} Beejamruth 2% (8 hrs), T_{11} Beejamruth 4% (8 hrs), T_{12} Beejamruth (8 hrs). To find out Influence of different seed treatment on growth, yield and seed quality parameters of cowpea showed that significant treatment on rate of field emergence, days to 50% flowering, plant height,

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number of primary branches, days to maturity, number of pods per plant, number of seeds per pod, 100 seed weight, seed yield per plant, seed yield per plot, biological yield, harvest index. Pre-sowing treatment which is concluded from the present study that the seeds of Cowpea (Variety – Bali 265) were treated with T_9 Panchagavya 6% (8 hrs) enhanced the above-mentioned characters.

Keywords: Cowpea; priming; seed treatment; panchagavya; beejamruth.

1. INTRODUCTION

Cowpea has unique place in Indian agriculture particularly from the nutritional and soil fertility point of view. It is well adopted to stress condition and possesses excellent nutritional quality. It is a multipurpose crop. The immature pods and leaves which are used as vegetable, the stem or haulm serves as fodder for livestock. The mature beans used as pulses. It is likely that the crop was first introduced to India during the Neolithic period, and therefore India appears to be a secondary centre of genetic diversity [1]. "Yardlong beans," a unique cultivar group (Sesquipedialis) of cowpea that produces very long pods widely consumed in Asia as a fresh green or "snap" bean, apparently evolved in Asia and is rare in African landrace germplasm.

The cowpea plant is an annual, erect or semi-erect, reaching a height of 2 m. It is slightly hairy with a well-developed root system. The flower colour varies through different shades of purple, pink, yellow and white. The pods contain 6 to 13 small, kidney shaped seeds. Cowpea (*Vigna sinensis* L.) is believed to have originated in Africa, Cowpea belongs to family leguminaceae. Recently, it is the important pulse crop cultivated throughout India [2-4]. In India, cowpea is consumed in several ways in southern India as whole grain. It is an important dietary protein food to humans. In addition to protein (23.86 g), it supplies fibre (16.3 g), fat (1.15 g), vitamins like A, C, B, niacin, minerals like calcium, magnesium, potassium, phosphorus, sodium, sugars and carbohydrates (60.3 g) per 100 g of grain [5] and known by many vernacular names like Lobia (Hindi), Alasande (Kannada) and Karamani (Tamil and Telugu).

Panchagavya means “Mixture of five products (dung, urine, milk, ghee, and curd) of the cow”. Of these the direct constituents are cow dung, urine, milk and the two derived products are ghee and curd. It is used as fertilizer and pesticides in agriculture operation. Panchagavya plays an important role in the quality of fruits and vegetables [6].

Beejamruth is used as a treatment for seeds, seedlings or any planting plant material. It is very effective in protecting young roots from fungus and other microbes as well as from soil borne and seed-borne diseases that commonly affect plants after the monsoon season [7-10]. Beejamruth is composed of similar ingredients as Jeevamrutha. Maximum microbial population was observed on the day of preparation in beejamruth, observed on the day of preparation in beejamrutha and on 10th day after preparation in jeevamrutha [11-15]. The presence of beneficial microorganisms in this liquid formulation might be mainly due to their constituents such as: cow dung, cow urine, legume flour and jaggery containing both macro and essential micro nutrients, many vitamins, essential amino acids, growth promoting substances like indole acetic acid (IAA), gibberellic acid (GA) and beneficial microorganisms [16].

Moringa (*Moringa oleifera*) is well known as a miracle tree. Zeatin stimulates cell division and cell elongation [17-20]. Disease-free leaves with no more than 40 days old are suitable for leaf extraction because it contains higher number of bioactive materials than older once [21]. The most common method of preparing leaf extract from fresh moringa leaves is collecting 200 g of fresh leaves then clean, wash and store them overnight at freezing temperature. After 24 hours, crash the stored leaves through mortar and pestle or blender and sieve through cheesecloth to collect the extract and dilute based on the plant requirement [22].

Neem leaves are also used as good priming agents contain flavonoids, steroids, carbohydrates, glycoside, antiquinone, terpenoids and alkaloids. It was shown that neem leaf extract has antifungal effects and can be used as fungicidal seed treatments for the control of seedborne diseases and for increasing seed germination and seedling emergence. Neem leaf extract was prepared using following method, the fresh neem leaves were collected separately and dried under shade. The shade dried leaves are powdered using mortar and pestle or electric

grinder. Then exactly weighed one gram of leaf powder using weighing balance and dissolved in 100 ml of distilled water which was measured already in the beaker to make 1% neem leaf extract. The prepared neem leaf extract was filtered by using muslin cloth to remove unwanted material and leaf debris.

Research was carried out with following objectives:

1. To determine the effect of different doses of seed treatment of Neem leaves Extract, Moringa Leaves Extract, Panchagavya and Beejamruth on growth, yield and yield attributing traits of Cowpea cv. BALI265.
2. To standardize the suitable doses of pre-sowing seed treatment of Neem laeaves extract, Moringa leaves extract, Panchagavya and Beejamruth seed treatment for cowpea crop.

2. MATERIALS AND METHODS

The present investigation was carried out to study the effect of Pre-sowing seed treatments of selected Organics on growth, yield and yield attributing traits of Cowpea (*Vigna unguiculata* L.) at the Field experimentation centre of Seed Science and Technology in the Department of Genetics and Plant Breeding, Sam Higginbottom Institute of Agriculture, Technology and Science, Naini Agriculture Institute, Prayagraj (U.P). Field experiment was laid out in Randomized Block Design (RBD) with treatment material consists of 12 treatments and untreated (control) seed of Cowpea and three replications respectively during Kharif 2021-22. viz., T_0- Control, T_1 – Moringa leaves extract priming @ 2%, 8 hrs, T_2- Moringa leaves extract @ 4%, 8hrs, T_3-Moringa leaves extract @ 6%, 8hrs, T_4- Neem leaves extract @ 2%, 8hrs, T_5- Neem leaves extract @ 4%, 8hrs, T_6- Neem leaves extract @ 6%, 8hrs, T_7- Panchagavya @ 2% 8 hrs, T_8- Panchagavya @ 4% 8 hrs, T_9 – Panchagavya @ 6%, 8hrs, T_{10}- Beejamruth – 2% 8hrs, T_{11}- Beejamruth priming – 4% 8hrs, T_{12}- Beejamruth @ 6% 8hrs, with the soaking durations of 8hrs with water. For the preparation of Panchagavya first mix thoroughly the fresh cow dung and ghee then incubate it for 2 days, after incubation add cow urine and 5 liters of water and mix it properly in morning and evening for one week, then add gram powder (500gm) along with cow milk and curd and mix it properly in the morning and evening for two weeks, after two weeks Panchagavya is ready and can be used directly. The unfortified seed served as control. The soaked seeds were surface dried for one day and were evaluated for the growth, yield attributing parameters *viz*., Maximum Rate of Field emergence, Days to 50% Flowering, Plant Height (cm) (30,60,90 DAS), Number of primary branches, Days to Maturity, Number of pods per plant, Number of seeds per pod, 100 seed weight, Seed yield per plant, Seed yield per plot, biological yield, Harvest index (%) to find the best treatment results was observed in Cowpea variety (Bali 265). Preparation of Beejamruth includes similar ingredients as Jeevamrutha - local cow dung that is a powerful natural Page 2 fungicide and cow urine which a strong anti-bacterial liquid, lime, and soil. Maximum microbial population was observed on the day of preparation in beejamrutha. observed on the day of preparation in beejamrutha and on 10th day after preparation in jeevamrutha [16]. Disease-free leaves with no more than 40 days old are suitable for leaf extraction because it contains higher number of bioactive materials than older once [21]. For the preparation of Moringa leaves extract the most common method of preparing leaf extract from fresh moringa leaves is collecting 200g of fresh leaves then clean, wash and store them overnight at freezing temperature. After 24 hours, crash the stored leaves through mortar and pestle or blender and sieve through cheesecloth to collect the extract and dilute based on the plant requirement [22]. Neem leaf extract was prepared using following method, the fresh neem leaves were collected separately and dried under shade. The shade dried leaves are powdered using mortar and pestle or electric grinder. Then exactly weighed one gram of leaf powder using weighing balance and dissolved in 100 ml of distilled water which was measured already in the beaker to make 1% neem leaf extract. The prepared neem leaf extract was filtered by using muslin cloth to remove unwanted material and leaf debris.

3. RESULTS AND DISCUSSION

3.1 Pre-Harvest Parameters

Significantly, maximum Rate of field emergence (680.8) was recorded in the treatment T_9 Panchagavya 6% 8hrs and it was followed by T_{11} Beejamruth 4% 8hrs (653). Minimum field emergence was recorded by T_0 – Control (436.3). Significantly, maximum height of plant (117.46 cm) was recorded by T_9 Panchagavya 6% 8hrs and it was followed by T_{11} Beejamruth 4% 8hrs (103.13cm). Minimum plant height was

recorded by T_0 – Control (67.50 cm). Significantly, maximum number of branches (5.00) was recorded by T_9 Panchagavya 6% 8hrs and it was followed by T_{11} Beejamruth 4% 8hrs (4.86). Minimum number of branches was recorded by T_0– Control (3.00). Significantly, Maximum days to 50% flowering was recorded by T_0-Control (62.66 days) and Minimum was recorded by T_9 Panchagavya 6% 8hrs (32.56 days) followed by T_{11} Beejamruth 4% 8hrs (32.76 days). Significantly, Maximum days to Maturity was recorded by T_0 Control (84.66 days) and Minimum was recorded by T_9-Panchagavya 6% 8hrs (72.00 days) followed by T_{11} Beejamruth 4% 8hrs (72.33 days). Similar findings were recorded in cowpea by Yashwanth Chandra K et al., [23].

Farooq et al., [24] investigated pulses seeds treated with Panchagavya (3% & 5%) cow urine 2%, 4% to reveal the effect on seed growth traits. They reported when seeds treated with Panchagavya 3% harvest index and seed yield per plant increased than compared to other

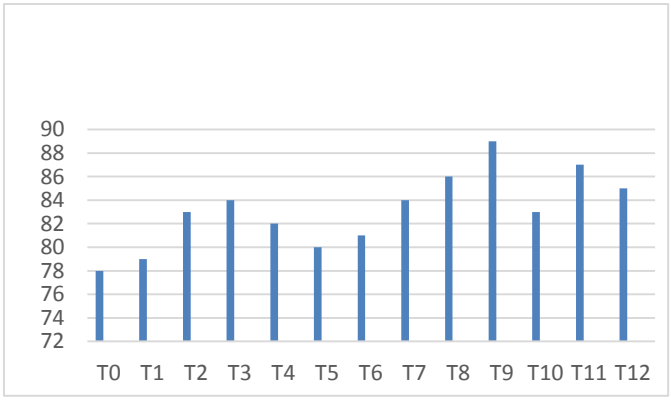

Fig. 1. Rate of field emergence

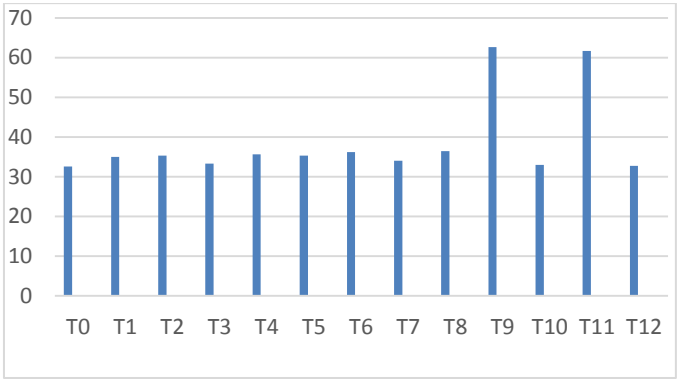

Fig. 2. Days to 50% flowering

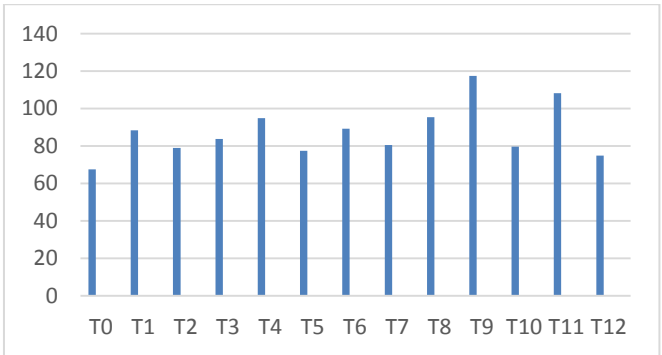

Fig. 3. Plant height (cm)

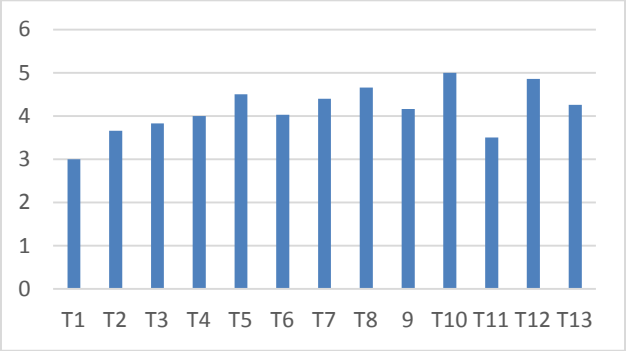

Fig. 4. Number of primary branches

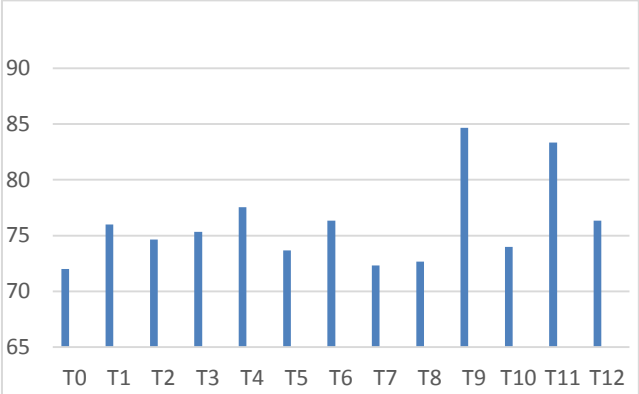

Fig. 5. Days to maturity

treatments. Avijit et al., [25] concluded that BD-501 and Panchagavya with their comparatively lower concentrations have significantly good effects of garden pea. In this context, T5 [BD-501 (2%) + Panchagavya (3%)] emerged as the best treatment combination in terms of number of primary branches and number of pods per plant. Moosavi et al., [26] studied effect of botanical leaf extract (neem grass leaf extract, curry leaf extract 2, 4, 8, 10%) and panchagavya 2, 4, 6, 8% with sorghum seeds. They revealed that when sorghum seeds treated with panchagavya biological yield per plant and seed yield per plant. These treatments were better than control seeds for seed quantity parameters.

Statistically analysed data was mentioned in Table 1.

3.2 Post-Harvest Parameters

Significantly, Maximum Number of Pods per plant was recorded by T_9 Panchagavya 6% 8hrs (13.46) and it was followed by T_{11} Beejamruth 4% 8hrs (13.33), Minimum number of Pods per plant was recorded by T_0– Control (5.80). Significantly, Maximum Number of seeds per pod was recorded by T_9 Panchagavya 6% 8 hrs (16.13) and it was followed by, T_{11}Beejamruth 4% 8 hrs (14.60) and Minimum Number of seeds per pod was recorded by T_0– Control (9.85). Significantly, Maximum 100 seed weight was recorded by T_9 Panchagavya 6% 8 hrs (12.40 g) followed by T_{11} Beejamruth 4% 8 hrs (12.16 g) and. Minimum 100 seed weight was recorded by T_0– Control (9.10g). Significantly, Maximum seed yield per plant was recorded by T_9 Panchagavya 6% 8 hrs (18.55 g) followed by T_{11} Beejamruth 4% 8 hrs (16.29 g). Minimum seed yield per plant was recorded by T_0– Control (9.09 g). Significantly, maximum seed yield per plot was recorded by T_9 Panchagavya 6% 8 hrs (1613.90 g) and it was followed by T_{11} Beejamruth 4% 8hrs (1295.80 g) and Minimum seed yield per plot was recorded by T_0– Control (615.80 g). Significantly, maximum biological yield was recorded by T_9 Panchagavya 6% 8 hrs (4636.94 g) and it was followed by T_{11} Beejamruth 4% 8hrs (3800.01 g). Minimum biological yield was recorded by T_0 (2689.21 g). Significantly, maximum harvest index was recorded by T_9 Panchagavya 6% 8hrs (34.80 %) and it was followed by T_{11} Beejamruth 4% 8hrs (34.10%). Minimum harvest index was recorded

by T_0– Control (22.90%). This was might be due to better water imbibition due to hydro priming and priming with Panchagavya, because seeds have a thick outer coat and they might take more time to start germination if sown unprimed because water imbibition is the first step of germination and insufficient moisture level hampers germination process. Similar findings were recorded in cowpea by Farooq et al., [24] and Moosavi et al., [26]. Panchagravya is used for maintaining the genetic biodiversity of the crop and the environment, to encourage the biological cycle within the farming system by using microbe, to promote the sustainable use of natural resources, to maintain the ecological balance between crop production and livestock, to assess the efficiency of panchagravya in vegetable crops, to produce high-quality yield in enough quantity by using panchagravya (Suraj Kumar, 2020). Beejamruth containing both macro and essential micro nutrients, many vitamins, essential amino acids, growth promoting substances like indole acetic acid (IAA), gibberlic acid (GA) and beneficial microorganisms [16].

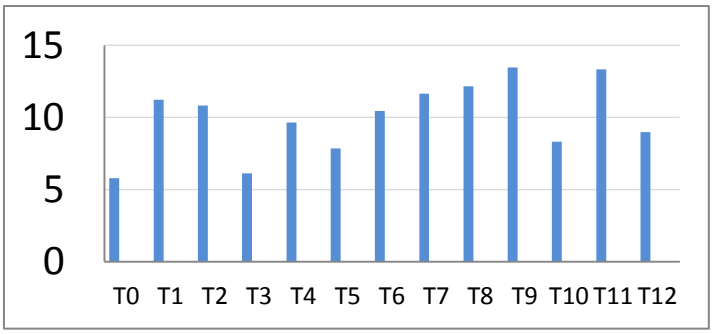

Fig. 6. Number of pods per plant

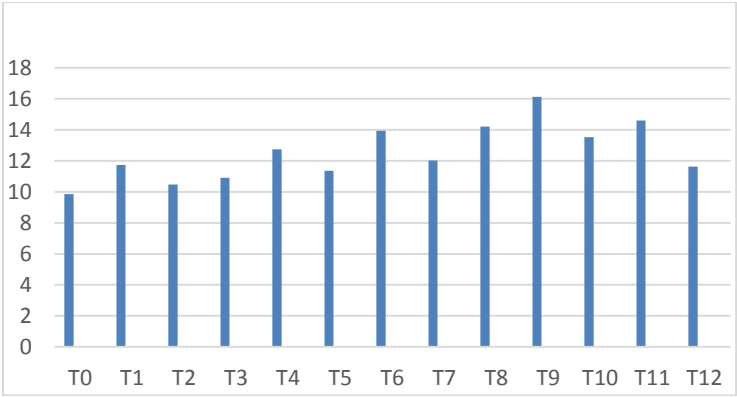

Fig. 7. Number of seeds per pod

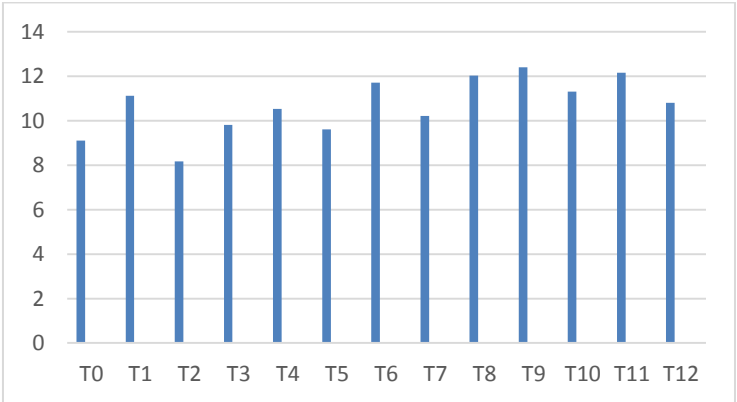

Fig. 8. 100 seed weight (gm)

Table 1. Pre harvest observation mean performance of Cowpea for growth and yield parameters

Notation	Treatments	Rate of Field Emergence	Days to 50% flowering	Plant height (cm) at 90 DAS	Number of Primary branches	Days to maturity
T0	Control	436.3	62.66	67.50	3.00	84.66
T1	Moringa leaves extract 2%(8 hrs)	575.3	35.00	88.40	3.66	76.00
T2	Moringa leaves extract 4% (8 hrs)	570	35.33	78.93	3.83	74.66
T3	Moringa leaves extract 6% (8 hrs)	565.2	33.33	83.70	4.00	75.33
T4	Neem leaves extract 2% (8 hrs)	605.7	35.66	94.83	4.50	77.55
T5	Neem leaves Extract 4% (8 hrs)	559.8	35.33	77.40	4.03	73.66
T6	Neem leaves extract 6% (8 hrs)	550.4	36.23	89.26	4.40	76.33
T7	Panchagavya 2% (8 hrs)	552.3	34.00	80.50	4.66	83.33
T8	Panchagavya 4% (8 hrs)	583.4	36.43	95.40	4.16	77.66
T9	Panchagavya 6% (8 hrs)	680.8	32.56	117.46	5.00	72.00
T10	Beejamruth 2%(8 hrs)	586.9	33.00	79.6o	3.50	74.00
T11	Beejamruth 4% (8 hrs)	653	32.76	103.13	4.86	72.33
T12	Beejamruth 6% (8 hrs)	582.7	61.66	74.80	4.26	76.33
	Grand Mean	**577.06**	**38.77**	**87.00**	**4.14**	**76.46**
	F test	**S**	**S**	**S**	**S**	**S**
	$CD_{0.05}$	**1.20**	**1.30**	**8.64**	**0.92**	**1.82**
	SE(m)	**0.41**	**0.44**	**2.96**	**0.31**	**0.62**
	SE(d)	**0.59**	**0.63**	**4.19**	**0.45**	**0.88**
	C.V	**4.79**	**1.98**	**5.89**	**13.30**	**1.41**

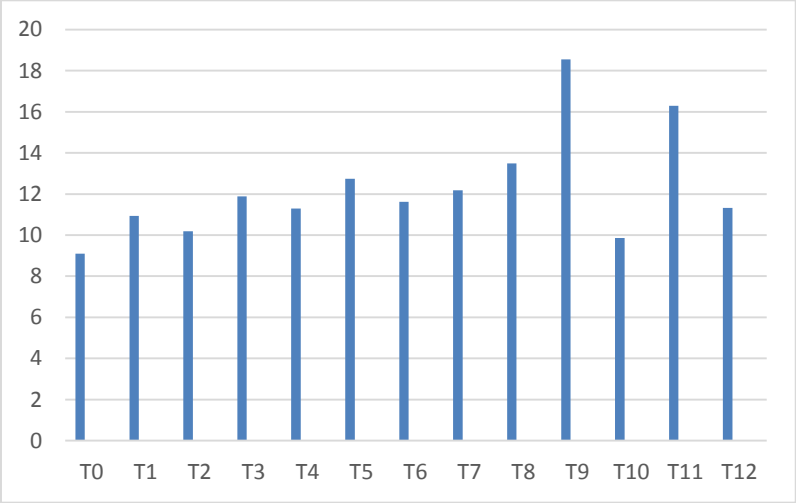

Fig. 9. Seed yield per plant (gm)

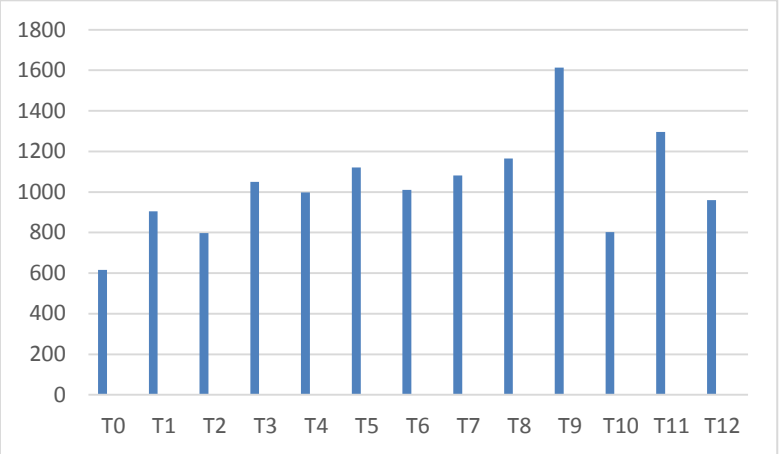

Fig. 10. Seed yield per plot (gm)

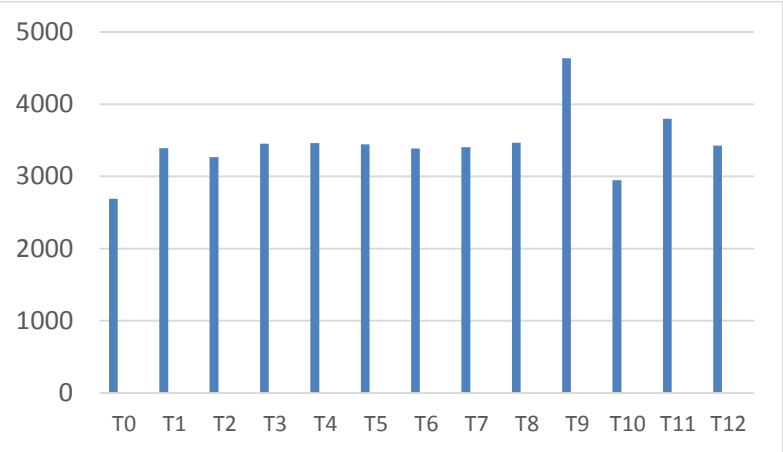

Fig. 11. Biological yield (gm)

Statistically analysed data was mentioned in Table 2.

Table 2. Post- harvest observation mean performance of cowpea for growth and yield parameters

Notation	Treatments	Number of pods per plant	Number of seeds per pod	100 Seed Weight (g)	Seed yield per plant (g)	Seed yield per plot (g)	Biological Yield (g)	Harvest index (%)
T_0	Control	5.80	9.85	9.10	9.09	615.80	2689.21	22.90
T_1	Moringa leaves extract 2% (8 hrs)	11.23	11.73	11.12	10.94	904.20	3391.59	26.66
T_2	Moringa leaves extract 4% (8 hrs)	10.83	10.46	8.17	10.19	797.80	3264.63	24.44
T_3	Moringa leaves extract 6% (8 hrs)	6.13	10.90	9.81	11.89	1050.40	3453.24	30.42
T_4	Neem leaves extract 2%(8 hrs)	9.66	12.75	10.53	11.29	997.06	3461.11	28.81
T_5	Neem leaves Extract 4% (8 hrs)	7.86	11.36	9.61	12.74	1120.70	3444.08	32.54
T_6	Neem leaves extract 6% (8 hrs)	10.46	13.93	11.70	11.62	1010.20	3384.25	29.85
T_7	Panchagavya 2% (8 hrs)	11.66	12.01	10.21	12.18	1080.86	3404.45	31.75
T_8	Panchagavya 4% (8 hrs)	12.16	14.21	12.03	13.49	1165.00	3467.29	33.60
T_9	Panchagavya 6% (8 hrs)	13.46	16.13	12.40	18.55	1613.90	4636.94	34.80
T_{10}	Beejamruth 2% (8 hrs)	8.33	13.53	11.31	9.86	802.23	2948.69	27.21
T_{11}	Beejamruth 4% (8 hrs)	13.33	14.60	12.16	16.29	1295.80	3800.01	34.10
T_{12}	Beejamruth 6% (8 hrs)	9.00	11.62	10.80	11.32	960.51	3427.99	28.02
	Grand Mean	10.00	12.55	10.69	12.26	1031.89	3444.12	29.62
	F test	S	S	S	S	S	S	S
	$CD_{0.05}$	1.76	1.44	0.40	1.55	46.63	70.87	0.57
	SE(m)	0.60	0.49	0.14	0.53	15.98	24.28	0.19
	SE(d)	0.85	0.70	0.20	0.75	22.59	34.34	0.27
	C.V	10.46	6.83	2.67	7.51	2.68	1.22	1.14

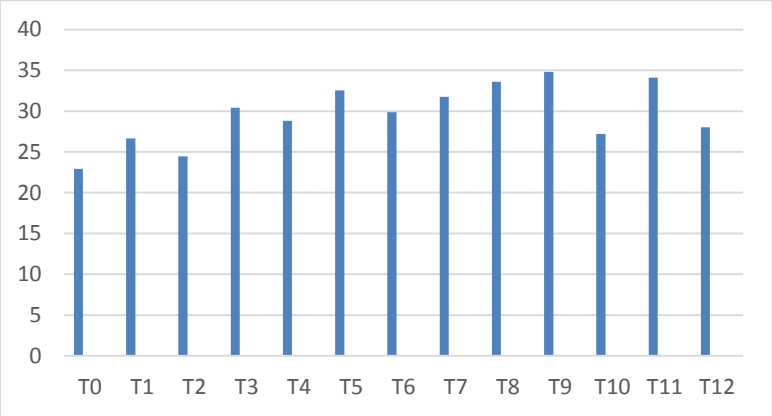

Fig. 12. Harvest index

4. CONCLUSION

It is concluded from the present study that the seeds of Cowpea (Variety – Bali 265) treated with Panchagavya @ 6% gave better performance than other treatments viz, Rate of field emergence (680.8), Days to 50% flowering (32.56), Plant height (117.46 cm), Number of primary branches per plant (5.00), Number of pods per plant (13.46), Number of seeds per pod (16.13), Days to Maturity (72.00), 100 Seed weight (12.40 g), Seed yield per plant (18.55 g), Seed yield per plot (1613.90 g), Biological yield (4636.94 g), Harvest index (34.80%) followed by Beejamruth 4% 8 hrs were recorded significantly higher compared to Control (Untreated). These conclusions are based on the results of crop duration investigation and therefore further investigation is needed to arrive at valid recommendation.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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