Plant Archives Vol. 25, No. 2, 2025 pp. 327-334 e-ISSN:2581-6063 (online), ISSN:0972-5210

Plant Archives

Journal homepage: http://www.plantarchives.org

DOI Url : https://doi.org/10.51470/PLANTARCHIVES.2025.v25.no.2.046

EFFECT OF PHYTOHORMONAL SEED PRIMING WITH INDOLE ACETIC ACID AND SALICYLIC ACID ON YIELD AND YIELD COMPONENT TRAITS IN GREENGRAM

Juhee Kumari[1], Vivek Kumar[1*], Sam A. Masih[2] and Ann Maxton[1]

[1]Department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj -211007, Uttar Pradesh, India

[2]Department of Molecular & Cellular Engineering, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj -211007, Uttar Pradesh, India

*Corresponding author E-mail : 23msagpb032@shiats.edu.in, ann.maxton@shiats.edu.in

(Date of Receiving-24-05-2025; Date of Acceptance-30-07-2025)

ABSTRACT

This research studied the effects of IAA and SA phytohormone seed priming upon Kharif seasons 2023 and 2024 at SHUATS Central Research Farm in Prayagraj Uttar Pradesh for analysing its impact on growth and the germination and yield performance of 10 mungbean (*Vigna radiata* L.) germplasm. Seeds were sown under Randomized Block Design (RBD), 100 ppm IAA (T1), 50 ppm SA (T2) and control (T0) with three replications. Somewhat variation was observed for all traits among genotypes and treatments. Across both years, IAA priming invariably increased plant height, number of primary branches, pods per plant, seeds per pod and seed yield per plant compared to SA and control treatments. In plant height and pod and number of pods per plant, genotype SUKETI 1 (G6) performed best whereas DGG 1 (G3) and MGG 347 (G2) had highest seed yield when treated with IAA. In general, seed priming with IAA increased mungbean productivity, and offers a good sustainable option for improving crop performance under different Agro climatic conditions.

***Key Words*:** Green gram, IAA; Mean; SA; Yield.

Introduction

India is the world's largest producer and consumer of pulses, and pulse crops are vital to Indian agriculture. Green gram (*Vigna radiata* L.), one of the pulses with chromosomal number 2n=22, is widely grown in India throughout the Zaid, kharif, and rabi seasons. Its genome is only 493.6–579.0 megabase (Mb) pairs in size. Because of its quick growth, early maturity (60–75 days), relative drought tolerance, and capacity to increase soil fertility through atmospheric nitrogen (N2) fixation in symbiosis with Rhizobium and Bradyrhizobium bacteria in the soil, mungbean adapts well to a variety of cropping systems (Somta *et al.*, 2022; Chakraborty and Bordolui 2021).

In addition to having a high concentration of amino acids (800.2 mg g^{-1}) and easily digestible protein (20.0 to 28.4%) (Yi Shen *et al.*, 2018), it also contains other biochemical components such as 3.3% fat, 5.9% fibre, 51.2% carbohydrates, 3.4% minerals, 0.3% vitamins, and 10.2% moisture (USDA Nutrient Database, 2015). It is also rich with vitamins A, C, B1 (thiamin), B3 (niacin), B2 (riboflavin), and B9 (folate), which are essential for energy metabolism and good bodily health (Kumar and Xu, 2018). Additionally, greengram is a good source of the same minerals that are necessary for physiological functions including oxygen transport and immunological response, namely potassium, magnesium, and iron (Saini *et al.*, 2024).

Phytohormone seed priming represents a promising budget-friendly approach which enhances crop quality performance in current years. The naturally occurring auxin indole-3-acetic acid (IAA) maintains essential functions regarding cell division and elongation and root development which drive overall plant growth specifically in stressful environments (Afzal *et al.*, 2005). SA functions as a signalling molecule to promote both plant responses to abiotic stress and enhance physiological

Table 1a: Mean value of Plant height of different green gram genotypes during 2023.

	Plant Height										Treat-ment Mean
	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	
	LGG-450	MGG-347	DGG-1	IM 2000-2	PANTM-4	SUKETI-1	DGGS-4	PAU-911	HUM-16	COGG-6	
T0	43.25	43.29	44.52	42.96	44.82	43.35	51.36	45.06	51.06	53.08	46.275
T1	80.67	79	88.65	72.67	85.33	89.27	73	71.33	74.08	75	78.9
T2	63.75	60.67	57	64.33	65.33	59.33	56.67	60.89	62.68	66.85	61.75
Genotypes Mean	62.56	60.99	63.39	59.99	65.16	63.98	60.34	59.09	62.61	64.98	

functions like photosynthesis and transpiration and ion absorption (Rivas-San Vicente & Plasencia, 2011). Additionally, the germination process is tightly coordinated, and the best seedling establishment is ensured by the interaction of IAA and SA with phytohormones such as gibberellins and abscisic acid (El Mergawi *et al.*, 2020; Miura and Tada, 2014). Because priming maximises the physiological and biochemical response mechanisms in plants to stress factors, it up-regulates plant preparation for strategies for abiotic and biotic challenges, leading to enhanced germination percent, seedling strength, and crop production (Conrath, 2011). With wide-ranging effects on agriculture and the environment, these procedures work together to ensure the productivity and health of Fabaceae crops. The objective of this experiment is to investigate how salicylic acid and indole acetic acid affect mungbean germination, growth, and soil fertility in order to increase the production of crops overall.

Materials and Methods

During Kharif 2023 and 2024, the current study was conducted at the Genetics and Plant Breeding Department's central research farm at the Naini Agricultural Institute of Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Prayagraj, Uttar Pradesh. 10 different genotypes of greengram were used in the study. The following genotypes were employed in the study: LGG-450, MGG-347, DGG – 1, IM 2000 – 2, PANTM – 4, SUKETI – 1, DGGS – 4, PAU – 911, HUM – 16, and COGG – 6. Three replications of the Randomized Block Design (RBD) were used to raise the genotypes. In three replications, the plot size is 1 m × 1 m, with plant to plant spacing of 10 cm and row to row spacing of 30 cm. Three lines were used in each replication. To compare the effects of seed priming, seeds were primed with indole acetic acid (T1) and salicylic acid (T2) for six hours, and they were also soaked in distilled water as a control (T0) for the same duration of time. After standardization, the dose of IAA (Indole acetic acid) @ 100 ppm or 0.1 g/L and SA (Salicylic acid) @ 50 ppm or 0.05 g/L was selected for the research work. The observations were recorded in this experiment such as plant height, number of primary branches, number of pods per plant, number of seeds per pod, and seed yield per plant.

Fig. 1a: Graphical representation of Mean value of Plant height of different green gram genotypes during 2023.

Result and Discussion

Plant Height (cm)

When the average of the treatments was calculated for 2023, the G5 (PANTM-4) had the considerably greatest plant height (65.16 cm), followed by G10 (COGG-6). In contrast, the G8 (PAU-911) had the lowest plant height (59.09 cm), followed by G4 (IPM-2000-2) (Table 1a and Fig. 1a). Considering the treatment of genotypes, T1 (100 ppm indole acetic acid) outperformed T2 (50 ppm in salicylic acid) and control in terms of plant height. After applying 100 ppm of IAA, a significantly higher plant height (89.27 cm) was observed for G6 (SUKETI-

Fig. 1b: Graphical representation of Mean value of Plant height of different green gram genotypes during 2024.

Table 1b: Mean value of Plant height of different green gram genotypes during 2024.

	Plant Height										Treat-ment Mean
	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	
	LGG-450	MGG-347	DGG-1	IM 2000-2	PANTM-4	SUKETI-1	DGGS-4	PAU-911	HUM-16	COGG-6	
T0	58.91	62.41	62.06	63.18	58.93	64.29	57.33	62.87	61.84	68.62	62.04
T1	73.64	78.01	77.58	78.98	73.66	80.36	71.66	78.59	77.3	85.78	77.56
T2	64.8	68.65	68.27	69.5	64.82	70.72	63.06	69.16	68.02	75.48	68.25
Genotypes Mean	65.78	69.69	69.30	70.55	65.80	71.79	64.02	70.21	69.05	76.63	

1) and G3 (DGG-1) when taking consideration of the interaction between treatments and genotypes, and lowest plant height (42.96 cm) was recorded for G4 (IPM-2000-2) when primed with distilled water, but when treated with 50 ppm of Salicylic acid lowest plant height (56.67) was observed for G7 (DGGS-4).

While in the 2nd year when the average was made over the treatments, plant height of G10 (COGG-6) was found to be maximum (76.63 cm) followed by that of G6 (SUKETI-1) during 2024 (Table 1b and Fig. 1b). It was observed that G7 (DGGS-4) produced the lowest plant height of average 64.02 cm preceded by G1 (LGG-450). Influence of T1 (Indole acetic acid @ 100 ppm) over all genotypes was significantly superior to that of 50 ppm Salicylic acid and control for the exhibition of plant height. While considering the interaction between treatments and genotypes, a significantly maximum plant height (85.78 cm) was recorded for G10 (COGG-6) followed by G6 (SUKETI-1) after application of 100 ppm of IAA. But shortest plant height i.e 57.33 cm was recorded for G7 (DGGS-4) when primed with distilled water preceded by the same genotype when treated with 50 ppm of SA.

If ranking was made amongst the average of genotypes about its plant height over treatments, it could be noticed as G5>G10>G6>G3>G9>G1>G2>G7>G4>G8 for the first year and G10>G6>G4>G8>G2>G3>G9> G5>G1>G7 for the second year.

Li *et al*., (2016) and Pérez-Llorca *et al*., (2019) were findings similar results in other crop where treatment of IAA significantly enhanced plant height.

Number of Primary Branches:

When the average was made over the treatments, the maximum number of primary branches 4.17 and 6.37 respectively was observed significantly for G7 (DGGS-4) followed by G9 (HUM-16) during 2023 and 2024. The minimum number of primary branches (2.67) was recorded for G5 (PANTM-4) preceded by G9 (HUM-16) for first year (Table 2a and Fig. 2a) but in second year minimum number of primary branches (5.37) was recorded for G1 (LGG-450) preceded by G5 (PANTM-4) (Table 2b and Fig. 2b). In case of treatment over genotypes, T1 (Indole acetic acid @ 100 ppm) was significantly superior (3.472 for 1st year & 6.18 for 2nd year) to that of 50 ppm Salicylic acid (3.465 for 1st year & 5.75 for 2nd year) and control (3.133 for 1st year & 5.37 for 2nd year) for the exhibition of number of primary branches. While considering the interaction between treatments and genotypes, significantly maximum number of primary branches 4.5 was recorded for G7 (DGGS-4) followed by G10 (COGG-6) for 1st year and 6.82 was recorded for G9 (HUM-16) followed by G8 (PAU-911) for 2nd year followed by G3 (IPM-2-3) after application of 100 ppm of IAA and minimum number of primary branches 2.33 was recorded for G9 (HUM-16) followed by G2 (MGG-347) & G5 (PANTM-4) for 1st year and 5.00 was recorded for G1 (LGG-450) & G5 (PANTM-

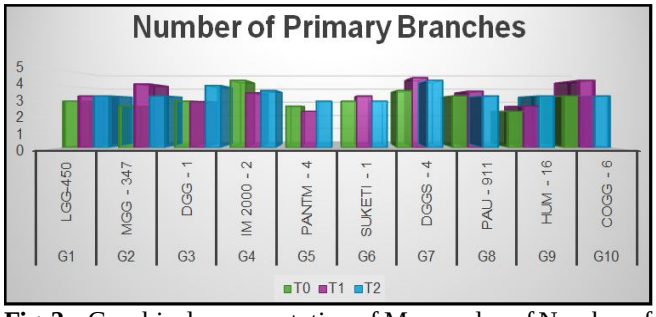

Fig. 2a: Graphical representation of Mean value of Number of Primary Branches of different green gram genotypes during 2023.

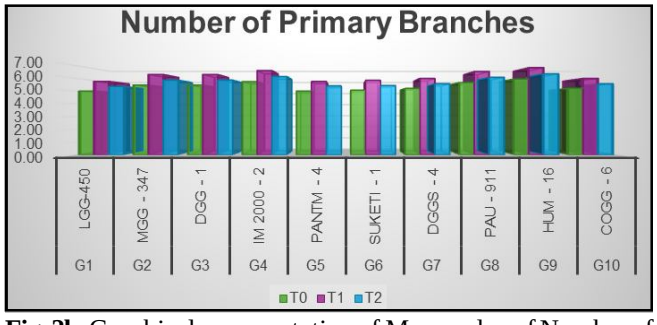

Fig. 2b: Graphical representation of Mean value of Number of Primary Branches of different green gram genotypes during 2024.

Table 2a: Mean value of Number of Primary Branches of different green gram genotypes during 2023.

	Number of Primary Branches										Treat-ment Mean
	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	
	LGG-450	MGG-347	DGG-1	IM 2000-2	PANTM-4	SUKETI-1	DGGS-4	PAU-911	HUM-16	COGG-6	
T0	3	2.67	3	4.33	2.67	3	3.67	3.33	2.33	3.33	3.133
T1	3.33	4.1	2.97	3.53	2.33	3.33	4.5	3.63	2.67	4.33	3.472
T2	3.33	3.33	4	3.67	3	3	4.33	3.33	3.33	3.33	3.465
Genotypes Mean	3.22	3.37	3.32	3.84	2.67	3.11	4.17	3.43	2.78	3.66	

Table 2b: Mean value of Number of Primary Branches of different green gram genotypes during 2024.

	Number of Pods Per Plant										Treat-ment Mean
	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	
	LGG-450	MGG-347	DGG-1	IM 2000-2	PANTM-4	SUKETI-1	DGGS-4	PAU-911	HUM-16	COGG-6	
T0	5.00	5.47	5.47	5.73	5.00	5.07	5.20	5.67	5.93	5.20	5.37
T1	5.75	6.29	6.29	6.59	5.75	5.83	5.98	6.52	6.82	5.98	6.18
T2	5.35	5.85	5.85	6.13	5.4	5.42	5.56	6.07	6.35	5.56	5.75
Genotypes Mean	5.37	5.87	5.87	6.15	5.38	5.44	5.58	6.09	6.37	5.58	

4) followed by G7 (DGGS-4) for 2nd year when primed with distilled water. While, when treated with 50 ppm of SA minimum number of primary branches 3.0 was recorded for G5 (PANTM-4) & G6 (SUKETI-1) for 1st year and 5.35 was recorded for G1 (LGG-450) for 2nd year.

Ranking amongst the average of genotypes about its number of primary branches over treatments for the first year was, G7> G4> G10> G8> G2> G3> G1> G6> G9> G5 and for the second year was, G9> G4> G8> G2=G3> G7=G10> G6> G5> G1.

Yang *et al.*, (2022) was observed similar results in other crops as with the application of IAA recorded maximum number of branches. Whereas Kikon *et al.*, (2024) was also observed similar results as application of IAA was found to enhance number of primary and secondary branching in linseed.

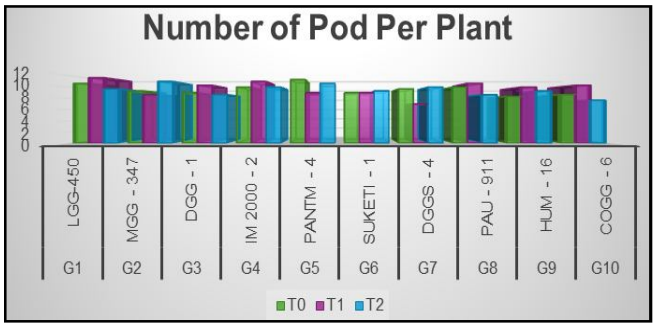

Fig. 3a: Graphical representation of Number of pods per plant of different green gram genotypes during 2023.

Number of Pod Per Plant:

During 2023 the genotype G1 (LGG-450) achieved the maximum pods per plant (10.67) with genotype G4 (IM 2000-2) and G5 (PANTM-4) producing 10.33 pods per plant. With an average of 8.89 pods per plant, genotypes G7 (DGGS-4) and G10 (COGG-6) had the lowest pods (Table 3a and Fig. 3a). After considering the effects of the treatments the highest mean number of pods per plant was obtained for T1 @100 ppm indole acetic acid with 9.767 pods, T2 @50 ppm salicylic acid with 9.501 pods and the control (T0) with 9.6 pods. The combination of 100 ppm IAA treatment with G1 (LGG-450) yielded 11.67 pods which was higher than G4 (IM-2000-2) and G2 (MGG-347) showed maximum pod production after T2 (50 ppm SA) treatment followed by G5 (PANTM-4). The combination of 100 ppm IAA (T1)

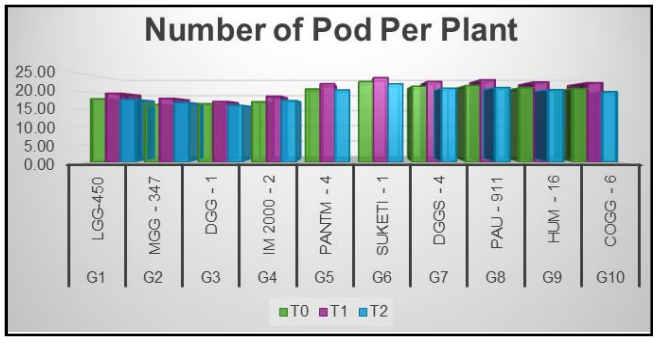

Fig. 3b: Graphical representation of Number of pods per plant of Primary Branches of different green gram genotypes during 2024.

Table 3a: Mean value of Number of pods per plant of different green gram genotypes during 2023.

	Number of Primary Branches										Treat-ment Mean
	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	
	LGG-450	MGG-347	DGG-1	IM 2000-2	PANTM-4	SUKETI-1	DGGS-4	PAU-911	HUM-16	COGG-6	
T0	10.67	9.33	9	10	11.33	9	9.67	10	8.33	8.67	9.6
T1	11.67	8.67	10.33	11	9	9	7	10.67	10	10.33	9.767
T2	9.67	11	8.67	10	10.67	9.33	10	8.67	9.33	7.67	9.501
Genotypes Mean	10.67	9.67	9.33	10.33	10.33	9.11	8.89	9.78	9.22	8.89	

Table 3b: Mean value of Number of pods per plant of different green gram genotypes during 2024.

	Number of Pods Per Plant										Treat-ment Mean
	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	
	LGG-450	MGG-347	DGG-1	IM 2000-2	PANTM-4	SUKETI-1	DGGS-4	PAU-911	HUM-16	COGG-6	
T0	18.07	16.40	16.67	17.27	20.87	23.00	21.67	21.87	21.20	20.93	19.79
T1	19.67	18.2	17.33	18.8	22.4	24.1	23	23.5	22.9	22.7	21.26
T2	17.87	17	16.2	17.6	20.6	22.33	21.1	21.3	20.67	20.1	19.48
Genotypes Mean	18.54	17.20	16.73	17.89	21.29	23.14	21.92	22.22	21.59	21.24	

treatment with G7 (DGGS-4) produced 7 pods which remained the most minimal observed value among all treatments and genotypes. G10 (COGG-6) demonstrated 7.67 pods when exposed to 50 ppm SA (T2).

In 2024 there were an average of number of pods (23.14, 22.22, 21.92) per plants of the genotypes G6 (SUKETI-1), G8 (PAU-911) and G7 (DGGS-4), respectively. At the same time, however, the lowest average was found in G3 (DGG-1) having 16.73 pods, and G2 (MGG-347) (17.20) (Table 3b and Fig. 3b). Among the treatments, T1, a treatment with 100 ppm indole acetic acid was found to be most effective based on the overall mean of the number of pods per plant (21.26) compared to the control (T0; 19.79) and T2 (salicylic acid, T2; 19.48).The maximum number of pods per plant (24.10), in G6 (SUKETI-1) treated with 100 ppm IAA (T1) followed by G8 (PAU-911) (23.50), and G7 (DGGS-4) (23.00), in the same treatment was considered based on the interaction between genotype and treatment. Under control conditions, G2 (DGG 347) with 16.40 and G3 (DGG-1) with 16.20 had relatively lower number, but only in T2 (50 ppm salicylic acid) G3 (DGG 1) had the lowest pod count (16.20).

Ranking amongst the average of genotypes about its number of primary branches over treatments for the first year was, G1> G4=G5> G8> G2>G3> G9> G6> G7=G10. And for the second year G6> G8> G7> G9> G5> G10> G1> G4> G2> G3. Similar finding recorded by Kikon *et al.*, (2024) observed the treatment of IAA found to record significantly higher number of capsules/plant compared to both Salicylic acid and control in linseed. Galeriani *et al.*, (2022) also find similar results.

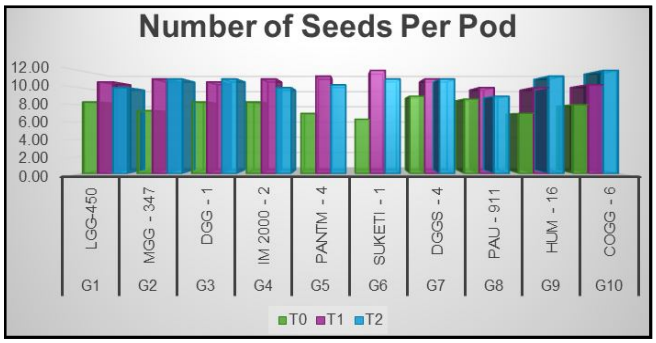

Fig. 4a: Graphical representation of Number of seeds per pod of Primary Branches of different green gram genotypes during 2023.

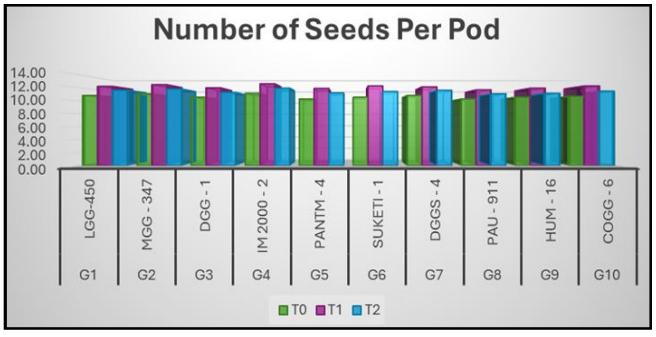

Fig. 4b: Graphical representation of Number of seeds per pod of Primary Branches of different green gram genotypes during 2024.

Table 4a: Mean value of Number of pods per plant of different green gram genotypes during 2023.

	Number of Seeds Per Pod										Treat-ment Mean
	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	
	LGG-450	MGG-347	DGG-1	IM 2000-2	PANTM-4	SUKETI-1	DGGS-4	PAU-911	HUM-16	COGG-6	
T0	8.33	7.33	8.33	8.33	7.00	6.33	9.00	8.67	7.00	8.00	7.83
T1	10.67	11.00	10.67	11.00	11.33	12.00	11.00	10.00	10.00	10.33	10.80
T2	10.00	11.00	11.00	10.00	10.33	11.00	11.00	9.00	11.33	12.00	10.67
Geno types Mean	9.67	9.78	10.00	9.78	9.55	9.78	10.33	9.22	9.44	10.11	

Table 4b: Mean value of Number of seeds per pod of different green gram genotypes during 2024.

	Number of Seeds Per Pod										Treat-ment Mean
	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	
	LGG-450	MGG-347	DGG-1	IM 2000-2	PANTM-4	SUKETI-1	DGGS-4	PAU-911	HUM-16	COGG-6	
T0	10.80	11.07	10.53	11.13	10.27	10.53	10.80	10.27	10.53	10.67	10.66
T1	12.2	12.47	11.97	12.6	11.9	12.27	12.13	11.67	11.93	12.27	12.14
T2	11.6	11.8	11.27	11.93	11.2	11.4	11.6	11.07	11.13	11.47	11.45
Geno types Mean	11.53	11.78	11.26	11.89	11.12	11.40	11.51	11.00	11.20	11.47	

Number of Seeds Per Pod:

In year 2023 evaluation of number of seeds per pod, G7 (DGGS-4) gave the highest mean value (10.33), followed by G3 (DGG-1) with 10.00 and G10 (COGG-6) with 10.11. On the other hand, the mean number of seeds per pod was lowest in G8 (PAU-911) (9.22), G9 (HUM-16) (9.44) (Table 4a and Fig. 4a). About the treatments, T1 (100 ppm indole acetic acid) gave the highest average number of seeds per pod (10.80), whereas T2 (50 ppm salicylic acid) was 10.67. The mean value 7.83 seeds per pod was seen for the control treatment (T0). Therefore, from within the treatment × genotype interaction, the maximum number of seeds per pod (12.00) recorded was in the case of G6 (SUKETI-1) in T1 treatment and in the case of G10 (COGG-6) at T2. 11.00 seeds per pod was also achieved with genotype G7 (DGGS-4) under T1 and T2. The lowest number of seeds per pod was 6.33 in G6 (SUKETI-1) at T0 (control conditions) and the rate was 7.00 in G5 (PANTM-4) and G9 (HUM-16).

During 2024 number of seeds per pod evaluation demonstrated that genotype G4 (IM 2000-2) achieved the maximum average value (11.89) and then G2 (MGG-347) (11.78) occupied second position followed by G1 (LGG-450) (11.53). Among the experimental lines G8 (PAU-911) had the lowest seeds (11.00) per pod and G5 (PANTM-4) followed with 11.12 seeds per pod based on (Table 4b and Fig. 4b) T1 (100 ppm indole acetic acid) proved most effective in the experiment by producing 12.14 seeds per pod which exceeded T2 (50 ppm salicylic acid) with 11.45 seeds and the untreated control (T0) which had 10.66 seeds per pod. The interaction of treatment with genotype G4 (IM 2000-2) with 100 ppm

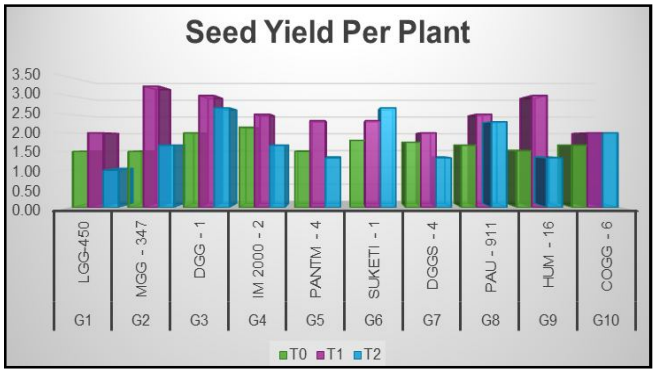

Fig. 5a: Graphical representation of Seed Yield Per Plant of different green gram genotypes during 2023.

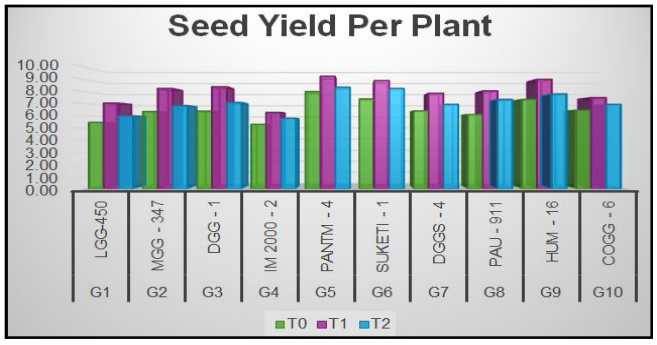

Fig. 5b: Graphical representation of Seed Yield Per Plant of different green gram genotypes during 2024.

Table 5a: Mean value of Seed Yield Per Plant of different green gram genotypes during 2023.

	Seed Yield Per Plant										Treatment Mean
	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	
	LGG-450	MGG-347	DGG-1	IM 2000-2	PANTM-4	SUKETI-1	DGGS-4	PAU-911	HUM-16	COGG-6	
T0	1.50	1.50	2.00	2.15	1.50	1.80	1.75	1.67	1.52	1.67	1.71
T1	2.00	3.25	3.00	2.50	2.33	2.33	2.00	2.50	3.00	2.00	2.49
T2	1.00	1.67	2.67	1.67	1.33	2.67	1.33	2.30	1.33	2.00	1.80
Genotypes Mean	1.50	2.14	2.56	2.11	1.72	2.27	1.69	2.16	1.95	1.89	

IAA treatment (T1) produced 12.60 seeds per pod as the maximum value when compared to other genotypes and treatments. The pod seed count was minimal at 10.27 under normal conditions for the combination of G5 (PANTM-4) and G8 (PAU-911).

Ranking amongst the average of genotypes about its number of seeds per pod over treatments for the first year was G7> G10> G3> G2=G4=G6> G1> G5> G9> G8 And for second year was G4> G2> G1> G7> G10> G6> G3> G9> G5> G8.

Similar finding recorded by Kikon *et al.,* (2024) also observed the treatment of IAA found to record significantly higher number of seeds/capsule compared to both Salicylic acid and control in linseed and Shah *et al*., (2023) also recorded similar results in mustard.

Seed Yield Per Plant

Additionally, mean of seed yield per plant for 2023 was assessed in the order of G3 (DGG-1) (2.56 g), G6 (SUKETI-1) (2.27 g), G8 (PAU-911) (2.16 g) and G2 (MGG-347) (2.14 g). G7 (DGGS-4) had the lowest means seed yield at 1,69 g, followed by G1 (LGG-450) 1,50 g (Table 5a and Fig. 5a). The treatments were given, and T1 (100 ppm indole acetic acid) was found to be the most effective with the highest average seed yield per plant (2.49 g), then T2 (50 ppm salicylic acid) had an average yield of 1.80 g, and T0 (control), had the least yield, 1.71 g. With respect to the effect of interaction (treatments x genotype) on seed yield the maximum yield was observed in G2 (MGG-347) at 100ppm IAA treatment (T1) followed by G3 (DGG1) and G9 (HUM-16) each recording 3.00 g under the same treatment. In control conditions (T0), the highest yield (2.15 g) was in G4 (IM 2000-2), and G3 (DGG-1) (2.00 g), and G6 (SUKETI-1) (1.80 g). However, the lowest seed yield (1.00 g) was obtained with G1 (LGG-450) under T2 (50 ppm salicylic acid); it was followed by G5 (PANTM-4) and G7 (DGGS-4) with 1.33 g in the same treatment. Like this, under control it has yielded relatively lower seed yields of 1.50 g each in G1 (LGG-450), G2 (MGG-347) and G5 (PANTM-4).

During evaluation of genotype in the year 2024, mean of seed yield per plant recorded from genotype G5 (PANTM-4) (8.53 g), G6 (SUKETI-1) (8.18 g), G9 (HUM-16) (8.05 g) and G3 (DGG-1) (7.30 g) respectively. The lowest average yield was that recorded in G4 (IM 2000-2) (5.79 g) followed by G1 (LGG-450) (6.17 g) (Table 5b and Fig. 5b). The treatments showed that T1 (100 ppm Indole acetic acid) had the highest impact on the yield with 8.05 g and overall mean, second was T2 (50 ppm Salicylic acid) with 7.14 g but the control T0 (6.52 g) had the lowest average seed yield. In terms of treatment × genotype interaction, the maximum seed yield (9.25 g) was obtained in G5 (PANTM-4) followed by G9 (HUM-16) with 9.00 g and G6 (SUKETI-1) with 8.90 g under T1 (100 ppm IAA). In the G5 (7.99 g), G6 (7.39 g) and G9 (7.35 g), the highest of seed yield was

Table 5b: Mean value of Seed Yield Per Plant of different green gram genotypes during 2024.

	Seed Yield Per Plant										Treatment Mean
	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	
	LGG-450	MGG-347	DGG-1	IM 2000-2	PANTM-4	SUKETI-1	DGGS-4	PAU-911	HUM-16	COGG-6	
T0	5.45	6.35	6.39	5.29	7.99	7.39	6.41	6.11	7.35	6.47	6.52
T1	7.05	8.25	8.4	6.29	9.25	8.9	7.85	8.05	9	7.5	8.05
T2	6	6.85	7.1	5.8	8.35	8.25	6.95	7.35	7.8	6.95	7.14
Genotypes Mean	6.17	7.15	7.30	5.79	8.53	8.18	7.07	7.17	8.05	6.97	

observed under control condition (T0). However, as can be seen on the other side, the lowest seed yield was achieved in G4 (IM 2000-2) in T0 that is 5.29 g, G1 (5.45 g) and G2 (6.35 g) in the same condition. However, yields of comparatively lower amounts were obtained on G4 (5.80 g) and G1 (6.00 g) under T2 (50 ppm SA).

Ranking amongst the average of genotypes about its seed yield per plant over treatments for the first year was G3> G6> G8> G2> G4> G9> G10> G5> G7> G1. And for second year G5> G6> G9> G3> G8> G2> G7> G10> G1> G4.

Similar findings were also reported in linseed by Kikon *et al.,* (2024) and Yagum *et al.,* (2023) where application of IAA (Indole acetic acid) enhance the seed yield.

Conclusion

It can be concluded that 100 ppm Indole Acetic Acid added to mungbean seeds boosted plant development and output more effectively than using no treatment or Salicylic Acid. During the IAA tests SUKETI-1, DGG-1, and MGG-347 produced strong and successful results through all the measured traits. The results revealed that 100 ppm IAA promoted the best plant development, especially it gave the higher plant height and seed yield than SA treatment and untreated plants in both years. With this research, IAA priming works well to enhance the farming results of mungbean farming at a low cost. To prove this method's overall effectiveness, they should test this method in different areas with different kinds of plants.

References

Afzal, I., Basra S.M.A. and Iqbal A. (2006). The effect of seed soaking with plant growth regulators on seedling vigor of wheat under saline conditions. *Journal of Stress Physiology & Biochemistry*, **2(1)**, 6-14. Doi: https://www.researchgate.net/publication/26493348

Chakraborty, A. and Bordolui S.K. (2021). Impact of seed priming with Ag nanoparticle GA*f* on germination and vigour of green gram. *International Journal of Current Microbiology and Applied Sciences*, **10(3)**, 941-950. https://doi.org/10.20546/ijcmas.2021.1003.119

Conrath, U. (2011). Molecular aspects of defence priming. *Trends in plant science*, **16(10)**, 524-531. https://doi.org/10.1016/j.tplants.2011.06.004

El-Mergawi, R.A. and Abd El-Wahed M.S. (2020). Effect of exogenous salicylic acid or indole acetic acid on their endogenous levels, germination, and growth in maize. *Bulletin of the National Research Centre*, **44**, 1-8. https://doi.org/10.1186/s42269-020-00416-7

Galeriani, T.M., Neves G.O., Santos Ferreira J.H., Oliveira R.N., Oliveira S.L., Calonego J.C. and Crusciol C.A.C. (2022). Calcium and Boron Fertilization Improves Soybean Photosynthetic Efficiency and Grain Yield. *Plants*, **11(21)**, 2937. https://doi.org/10.3390/plants11212937

Ganesan, K. and Xu B. (2018). A critical review on phytochemical profile and health promoting effects of mung bean (*Vigna radiata*). *Food Science and Human Wellness*, **7(1)**, 11-33. https://doi.org/10.1016/j.fshw.2017.11.002

Kikon, N., Longkumer L.T., Amlari I., Tzudir L., Nongmaithem D., Yadav R. and Rathod S. (2024). Effect of IAA, GA3, Salicylic Acid and Tebuconazole on Growth, Productivity and Economics of Linseed (*Linum usitatissimum* L.) Cultivation under Rainfed Conditions. *Indian J. of Agricultural Research*. 1-7. Doi-10.18805/IJARe.A-6289.

Li, S-B., Xie Z-Z., Hu C-G. and Zhang J-Z. (2016) A Review of Auxin Response Factors (ARFs) in Plants. Front. *Plant Sci*. **7**, 47. https://doi.org/10.3389/fpls.2016.00047

Mariana Rivas-San Vicente, Javier Plasencia, Salicylic acid beyond defence: its role in plant growth and development, *J. of Experimental Botany*, **62(10)**, June 2011, Pages 3321–3338, https://doi.org/10.1093/jxb/err031

Miura, K. and Tada Y. (2014). Regulation of water, salinity, and cold stress responses by salicylic acid. *Frontiers in Plant Science*, **5**, 4. https://doi.org/10.3389/fpls.2014.00004

Pérez-Llorca, M., Muñoz P., Müller M. and Munné-Bosch S. (2019). Biosynthesis, Metabolism and Function of Auxin, Salicylic Acid and Melatonin in Climacteric and Non-climacteric Fruits. *Front. Plant Sci*. **10**, 136. https://doi.org/10.3389/fpls.2019.00136

Saini, N., Patil S.S. and Birunagi S.M. (2024). Optimizing Spacing and Nutrient Management for Enhanced Growth and Yield of Summer Green Gram (*Vigna radiata* L.): A Comprehensive Review. *International Journal of Environment and Climate Change*, **14(6)**, 224-236. https://doi.org/10.9734/ijecc/2024/v14i64223

Shah, S.H., Islam S., Alamri S., Parrey Z.A., Mohammad F. and Kalaji H.M. (2023). Plant Growth Regulators Mediated Changes in the Growth, Photosynthesis, Nutrient Acquisition and Productivity of Mustard. *Agriculture*, **13(3)**, 570. https://doi.org/10.3390/agriculture13030570

Somta, P., Laosatit K., Yuan X. and Chen X. (2022). Thirty Years of Mungbean Genome Research: Where Do WeStand and What Have We Learned? *Front. Plant Sci*. **13**, 944721. https://doi.org/10.3389/fpls.2022.944721

USDA (2015). Nutrient Database. Composition of Foods Raw, Processed, Prepared.

Yagum, T., Longkumer L.T., Kikon N., Amlari I. and Tzudir L. (2023). Effect of PGRs on yield, quality parameters and economics of linseed (*Linum usitatissimum* L.) cultivation under rainfed conditions of Nagaland. *Biological Forum- An International Journal*. **15**, 38-44. https://www.researchgate.net/publication/373774959_Effect_of_PGRs_on_Yield_Quality_Parameters_and_Economics_of_Linseed_Linum_usitatissimum_L_Cultivation_under_Rainfed_Conditions_of_Nagaland

Yang, Y., Hu Y., Li P., Hancock J.T. and Hu X. (2022). Research Progress and Application of Plant Branching. *Phyton-International Journal of Experimental Botany*, **92(3)**, 679–689. https://doi.org/10.32604/phyton.2023.024904

Zhu, Y.-S., Shuai S. and Fitz Gerald R. (2018). Mung bean proteins and peptides: nutritional, functional and bioactive properties. *Food & Nutrition Research*, **62**. https://doi.org/10.29219/fnr.v62.1290