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# Effect of foliar application of PGRs on growth and yield characteristics of yard long bean (*Vigna unguiculata* sub sp *sesquipedalis* L.) var. Arka Mangala

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## Abstract
The experiment implemented RBD with three replications and eleven treatments to evaluate the growth and yield of yard long beans. All treatments exhibited superior growth and yield. Treatment $T_7$, involving NAA 50 ppm + BAP 50 ppm, showed remarkable improvements in growth and yield characteristics, such as maximum vine length (2.06 m), number of branches $plant^{-1}$ (13.50), number of pods $plant^{-1}$ (19.17), average pod length (51.57 cm), total pod yield $plant^{-1}$ (527 g), and pod yield $ha^{-1}$ (331 q). On the other hand, Treatment $T_8$ (NAA 100 ppm + BAP 100 ppm), demonstrated the shortest time to first picking (57 days). Hence, both $T_7$ and $T_8$ were significantly more effective than the other treatments in promoting better growth and yield of yard long beans.

**Keywords:** Yard long bean, plant growth regulators, NAA, $GA_3$ and BAP

## Introduction
Yard long bean, scientifically known as *Vigna unguiculata* sub sp *sesquipedalis* L., is a significant legume vegetable crop with a chromosome number of 2n = 22. It originates from East and South-East Asia and goes by various names such as asparagus bean, chinese long bean, pea bean, string bean, snake bean, and borboti (Bhagavati *et al*. 2019) [2]. This variety of cowpea is primarily cultivated for its remarkably long (35 to 75 cm) immature pods and shares similar uses with green beans. As an annual crop, yard long bean is highly self-pollinating. It is mainly grown for its tender green pods, which are popular in vegetable dishes. The vegetable is extensively cultivated in countries like Bangladesh, India, Indonesia, the Philippines, and Sri Lanka (Ullah *et al*. 2011) [18].

Being a leguminous vegetable, yard long bean is valued for its nutritional content. Its pods (23.5 to 26.3%) and leaves contain a good amount of digestible protein. Additionally, yard long beans are a rich source of vitamins A and C, as well as calcium (72.0 mg), phosphorus (59 mg), iron (2.5 mg), carotene (564 mg), thiamine (0.07mg), riboflavin (0.09 mg), and vitamin C (24 mg) per 100 g of edible pods. Moreover, the crop contributes to soil fertility as it can fix atmospheric nitrogen. It also contains essential micronutrients, including 102.69-120.02 mg $kg^{-1}$ of Iron, 32.58-36.66 mg $kg^{-1}$ of Zinc, 2.92-3.34 mg $kg^{-1}$ of Manganese, and 0.33-0.57 mg $kg^{-1}$ of Cobalt (Ano and Ubochi, 2008) [1].

Plant growth regulators, also known as plant hormones, have the ability to influence the metabolic and physiological responses of plants, ultimately affecting their growth and development (Hayat *et al*. 2010) [8]. These regulators can be either naturally occurring or synthetic compounds that are applied directly to specific plants with the aim of modifying their physiological processes or structure. The goal is often to enhance the quality, increase yields, control undesirable vegetative growth, promote fruiting, and facilitate harvesting (Sarkar *et al*., 2020). Different plant growth regulators may act similarly in various stages of the same plant but have distinct effects. They play a crucial role in regulating physiological processes, and synthetic growth regulators can also stimulate the growth and development of crops, leading to increased total dry mass and yield [(Sanjida *et al*. (2019), Cho *et al*. (2008), Chibu *et al*. (2000), & Das and Das (1996)] [12, 4, 3, 5]. In the case of enhancing yard long bean output, several growth regulators like auxins, gibberellins, and cytokinin have been employed to achieve the desired results. These substances can positively impact the growth and productivity of yard long bean plants.

## Materials and Methods

Present study entitled "Effect of foliar application of PGRs on growth and yield characteristics of yard long bean (*Vigna unguiculata* sub sp *sesquipedalis* L.) var. Arka Mangala" was carried out during the *Rabi* season of 2022-23 at the Krishi Vigyan Kendra Raipur farm under Indira Gandhi Krishi Vishwavidyalaya, Chhattisgarh. The experiment followed a randomized block design (RBD) with three replications, including a control group and ten treatment groups: $T_1$ (NAA 50 ppm), $T_2$ (NAA 100 ppm), $T_3$ ($GA_3$ 50 ppm), $T_4$ ($GA_3$ 100 ppm), $T_5$ (BAP 50 ppm), $T_6$ (BAP 100 ppm), $T_7$ (NAA 50 ppm + BAP 50 ppm), $T_8$ (NAA 100 ppm + BAP 100 ppm), $T_9$ (NAA 50 ppm + $GA_3$ 50 ppm), and $T_{10}$ (NAA 100 ppm + $GA_3$ 100 ppm). The foliar application was done at 40, 55, and 70 days after sowing (DAS), with the seeds sown on 19$^{th}$ October 2022. Throughout the experiment, various growth and yield parameters were observed, including vine length (m), number of branches plant$^{-1}$, number of pods plant$^{-1}$, average length of pods (cm), days to first picking, total pod yield plant$^{-1}$, and total pod yield ha$^{-1}$.

## Results and Discussion

The findings of this study provide strong evidence that the application of various plant growth regulators significantly enhanced several key parameters related to the growth and yield of the vines. These parameters include vine length (m), number of branches plant$^{-1}$, number of pods plant$^{-1}$, average length of pods (cm), days to first picking, total pod yield plant$^{-1}$ (g), and total pod yield ha$^{-1}$ (q). The results clearly demonstrate that the plant growth regulators had a positive impact on these aspects compared to the control group. Detailed mean values for each growth and yield parameter in relation to the specific plant growth regulators can be found in Table 1.

Vine length was obtained maximum (2.06 m) in $T_7$ (NAA 50 ppm + BAP 50 ppm) which was statistically at par with $T_3$ ($GA_3$ 50 ppm) 2.05 and $T_9$ (NAA 50 ppm + $GA_3$ 50 ppm) 2.06 m. However, the minimum vine length (1.80 m) was observed in $T_0$ (control) of yard long bean followed by $T_5$ (BAP – 50 ppm) 1.83 m. Remarkable increase in the vine length was observed with NAA 50 ppm + BAP 50 ppm. It is possible that the observed effects are a result of BAP causing cell division and NAA promoting cell elongation, leading to increased vine length. These experimental findings align with previous studies conducted by Rai *et al*. (2004) [10], Ullah *et al*. (2007) [18], Thaware *et al*. (2008) [16], and Sahu and Verma (2020) [7].

The highest recorded number of branches plant$^{-1}$ (13.50) was observed in treatment $T_7$ (NAA 50 ppm + BAP 50 ppm. On the other hand, the lowest number of branches plant$^{-1}$ (9.00) was found in the control group ($T_0$) of yard long beans, followed by $T_4$ ($GA_3$ 100 ppm) 9.17. The increase in the number of branches plant$^{-1}$ can be attributed to the application of NAA, which stimulates shoot growth and elongation of cells. This is because auxin and cytokinin work together to regulate cell division, resulting in a synergistic effect that leads to a greater number of branches plant$^{-1}$. These results were also supported with the application of NAA in cowpea by Desai and Deore (1985) [6], Thaware *et al*. (2006) [15].

The highest number of pod plant$^{-1}$ (19.17) was observed in $T_7$ (NAA 50 ppm + BAP 50 ppm) followed by $T_8$ (NAA 100 ppm + BAP 100 ppm) and $T_4$ ($GA_3$ 100 ppm) having a number of green pod (18.67 and 18.50 respectively). Whereas $T_0$ (control) was observed with minimum number of pods plant$^{-1}$ 15.00 followed by $T_9$ (NAA 50 ppm + $GA_3$ 50 ppm) 16.17. The rise in the pod count per plant could be attributed to a higher percentage of pod formation resulting from the use of NAA and BAP. These findings align with the outcomes observed in previous studies conducted by Shinde *et al*. (1991) [14] and Thaware *et al*. (2008) [16] on cowpea.

Maximum length of pod was recorded in $T_7$ (NAA 50 ppm + BAP 50 ppm) *i.e.* 51.50 cm which was at par with $T_5$ (BAP 50 ppm) 48.67 cm and $T_8$ (NAA 100 ppm + BAP 100 ppm) 48.83 cm. However, the length of pod was observed minimum (36.83 cm) under $T_0$ (control) followed by $T_2$ (NAA 100 ppm) 40.67 cm. Increase in average length of pod may be due to cell elongation caused by NAA and BAP. Experimental results are in accordance with the results observed by Resmi and Gopalakrishnan (2004) [11] and Mandal and Sanyal (2004) [9] in French bean.

Application of $T_7$ (NAA 50 ppm + BAP 50 ppm) resulted in minimum number of days to first picking (57 days) which was at par with $T_4$ ($GA_3$ 100 ppm) 57.33 days and $T_2$ (NAA 100 ppm) 57.67 days. However, the maximum number of days to first picking (65.67 days) was recorded in $T_0$ (Control) followed by $T_1$ (NAA 50 ppm) 63. Number of days to first picking was minimum in $T_7$ (NAA 50 ppm + BAP 50 ppm) which might be due to application of NAA promote maturation of the ovary wall and promote steps early fruiting. These results are in confirmation with Sahu and Verma (2020) [7].

In the experiment, the maximum pod yield plant$^{-1}$ was recorded in $T_7$ (NAA 50 ppm + BAP 50 ppm), reaching 527 g. This yield was statistically similar to the yields of $T_4$ ($GA_3$ 100 ppm) at 443.10 g, $T_5$ (BAP 50 ppm) at 446.87 g, and $T_8$ (NAA 100 ppm + BAP 100 ppm) at 448.80 g. On the other hand, the minimum pod yield plant$^{-1}$ (343.92 g) was observed in the control group ($T_0$), followed by $T_{10}$ (NAA 100 ppm + $GA_3$ 100 ppm) at 357.67 g. The increase in pod yield plant$^{-1}$ was attributed to the application of NAA, which led to a higher number of branches and pods plant$^{-1}$. These findings align with a similar study conducted by Sahu and Verma in 2020 [7].

Maximum pod yield ha$^{-1}$ was recorded in $T_7$ (NAA 50 ppm + BAP 50 ppm) *i.e.* 331 q which was followed by $T_8$ (NAA 100 ppm + BAP 100 ppm) having a pod yield ha$^{-1}$ 265.33 q. However, the minimum pod yield ha$^{-1}$ (190 q) was observed in $T_0$ (control) followed by $T_2$ (NAA 100 ppm) 236.33 q. The rise in pod yield ha$^{-1}$ was primarily attributed to a noticeable increase in the number of branches plant$^{-1}$, number of pods plant$^{-1}$, and pod yield plant$^{-1}$, resulting from the application of NAA (Naphthalene acetic acid) and BAP (Benzyl amino purine). These findings align with the conclusions reported in previous studies by Thaware *et al*. (2006) [15] and Sahu & Verma (2020) [7].

**Table 1:** Impact of plant growth regulators on growth and yield parameters of yard long bean var. Arka Mangala

| Treatments | Vine Length (m) | Number of branches plant$^{-1}$ | Number of pods plant$^{-1}$ | Average length of pods (cm) | Days to first picking | Total pod yield plant$^{-1}$ (g) | Total pod yield ha$^{-1}$ (q) |
|---|---|---|---|---|---|---|---|
| $T_0$ Control (Water spray) | 1.80 | 9.00 | 15.00 | 36.83 | 65.67 | 343.92 | 190.00 |
| $T_1$ NAA 50 ppm | 1.89 | 9.33 | 17.50 | 44.50 | 63.00 | 429.33 | 254.33 |
| $T_2$ NAA 100 ppm | 1.88 | 9.50 | 18.17 | 40.67 | 57.67 | 421.33 | 236.67 |
| $T_3$ $GA_3$ 50 ppm | 2.05 | 10.00 | 18.17 | 47.00 | 60.33 | 395.67 | 255.33 |
| $T_4$ $GA_3$ 100 ppm | 1.96 | 9.17 | 18.50 | 48.00 | 57.33 | 443.10 | 254.00 |
| $T_5$ BAP 50 ppm | 1.83 | 9.67 | 18.33 | 48.67 | 61.00 | 446.87 | 254.00 |
| $T_6$ BAP 100 ppm | 2.00 | 9.50 | 17.67 | 44.67 | 62.00 | 413.60 | 260.33 |
| $T_7$ NAA + BAP (50 ppm + 50 ppm) | 2.06 | 13.50 | 19.17 | 51.50 | 59.33 | 527.00 | 331.00 |
| $T_8$ NAA + BAP is (100 ppm + 100 ppm) | 1.94 | 9.33 | 18.67 | 48.83 | 57.00 | 448.80 | 265.33 |
| $T_9$ NAA + $GA_3$ (50 ppm + 50 ppm) | 2.06 | 9.33 | 16.17 | 45.20 | 60.00 | 377.30 | 248.00 |
| $T_{10}$ NAA + $GA_3$ (100 ppm + 100 ppm) | 2.01 | 9.67 | 16.33 | 43.83 | 58.00 | 357.67 | 252.67 |

## Conclusions

The current study demonstrates that a combination of two plant growth regulators, Naphthalene acetic acid (NAA) and 6-Benzyle amino purine (BAP), has a positive impact on the growth and yield characteristics of yard long bean. The application of these sprays has shown promising results in enhancing both the growth and yield of the yard long bean plant. Among the various treatments tested, Treatment $T_7$, which consisted of NAA 50 ppm and BAP 50 ppm, proved to be highly effective in promoting various parameters. These included vine length (2.06 m), the number of branches plant$^{-1}$ (13.50), the number of pods plant$^{-1}$ (19.17), average pod length (51.57 cm), total pod yield plant$^{-1}$ (527 g), and pod yield ha$^{-1}$ (331 q). On the other hand, treatment $T_8$ (NAA 100 ppm and BAP 100 ppm), resulted in the shortest time to the first harvest (57 days). In conclusion, the combined application of NAA and BAP is advantageous in boosting the growth and yield of yard long beans.

## Reference


1. Ano AO, Ubochi CI. Nutrient composition of climbing and prostrate vegetable cowpea accessions. African Journal of Biotechnology. 2008;7(20):3795-3798.
2. Bhagavati PP, Kiran TSKK, Prasad NV, Reddy MLN. Correlation for growth, quality, yield and yield components in yard long bean (*Vigna unguiculata* (L.) walp. ssp. *sesquipedalis* Verdc.), International Journal of Current Microbiology and Applied Science. 2019;8(1):410-414.
3. Chibu H, Shibayama H, Mitsutomi M, Arima S. Effects of chitosan application on growth and chitinase activity in several crops. Marine & Highland Bioscience Center Report. 2000;12:27-35.
4. Cho MH, No HK, Prinyawiwatkul W. Chitosan treatments affect growth and selected quality of sunflower sprouts. Journal of Food Science. 2008;73(1):S70-S77.
5. Das BC, Das TK. Studies on the response of $GA_3$, NAA and Etherl on the vegetative growth and yield of pumpkin. Orisssa Journal of Horticulture. 1996;24:74-78.
6. Desai SN, Deore DD. Influence of growth regulators on the seed production of cowpea. Journal of Maharashtra Agriculture University. 1985;10(1):89-90.
7. Dilip Kumar Sahu, Annu Verma. Effect of plant growth regulators on growth and yield of cowpea. International Journal of Chemical Studies. 2020;8(6);1736-1738.
8. Hayat Q, Hayat S, Irfan M, Ahmad A. Effect of exogenous application of salicylic acid under changing environment. a review. Environmental and Experimental Botany. 2010;68(1):14-25.
9. Mandal S, Sanyal D. Response of French bean to foliar application of NAA and CPPU. Horticulture Journal. 2004;17(3):235-240.
10. Rai N, Patel RK, Yadav DS, Asati BS. Effect of PGR on growth, flowering and yield of pole type French bean cv. Meghalaya local. Vegetable science. 2004;31(1):95-97.
11. Reshmi, Gopalakrishnan. Studied the effect of plant growth regulators on the performance of yard long bean (*Vigna unguiculata var. sesquipedalis* L. Verdcourt). Journal of Tropical Agriculture. 2004;42(1-2):55-57.
12. Sanjida T, Sikdar MSI, Islam MS, Rahman MM, Alam MJ. Response of Mungbean growth and yield to $GA_3$ rate and time of application. Asian Journal of Crop, Soil Science and Plant Nutrition. 2019;1(2):28-36.
13. Sarkar BC, Minjee PR, Nisu ZU, Islam MJ, Ali MJ. Morpho-physiological characteristics and yield attributes of three aromatic rice cultivars in response to 6- BAP. International Journal of Agriculture and Medicinal Plants. 2020;1(1):1-9.
14. Shinde AK, Jamadagni BM, Birari SP. Effect of foliar spray of growth regulators and $KNO_3$ on growth and yield of cowpea (*Vigna unguiculata* L.) variety VCM-8. Indian Journal of plant Physiology. 1991;34(4):392-395.
15. Thaware BG, Jadhav BB, Mahadik SG, Mane AV. Effect of foliar application of growth regulators on growth and yield of cowpea (*Vigna unguiculata* L.). Indian Journal of Plant Physiology. 2006;18(2):135-139.
16. Thaware BG, Jadhav BB, Mahadik SG, Kandalkar MP. Effect of seed soaking with different growth regulators on growth and yield of cowpea (*Vigna unguiculata*). Journal of Eco biology. 2008;22(1):53-56.
17. Uallah J, Quazi AF, Hossian F. Response of growth, yield attributes and yield to the application of KNP and NAA in cowpea (*Vigna unguiculata* L. Walp.). Bangladesh Journal Botany. 2007;36(2);127-132.
18. Ullah MZ, Hassan MJ, Rahman AHMA, Saki AI. Genetic variability, character association and path analysis in yard long bean, SAARC Journal of Agriculture. 2011;9(2):9-16.