

Original Research Article

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## Effect of Alpha-Naphthalene Acetic Acid [NAA] on Growth, Flowering and Yield of *Vinca rosea* cv. *Catharanthus caramel*

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### ABSTRACT

A field trial was conducted in the Department of Floriculture and Landscaping, Orissa University of Agriculture and Technology, Bhubaneswar to find out the effect of plant growth regulators at three concentrations viz, NAA (25, 50 & 100ppm) on growth and flowering of *Vinca rosea* (*Catharanthus roseus* L.) during May 2015 to September 2015. The growth regulators were applied in form of foliar spray, once at 30 days after planting (DAS) seedlings and again after 30 days of first application. Plants sprayed with distilled water served as control. The results of the study revealed that application of NAA at 50ppm significantly reduced plant height (28.33, 30.13, 30.53, 36.33 & 43.76cm) number of leaves (364.33) per plant. However, number of branches per plant were significantly improved due to application of NAA 25ppm (19.33) & NAA100ppm (18.66) without showing significant variation from each other. Besides significant delay in flower bud initiation (20.66 days). Although application of NAA at 25ppm & 100ppm significantly increased the number of flowers (18.80 & 17.96 nos respectively) per plant, the size of flowers was significantly increased (5.86 cm & 5.06 cm dia respectively) under these treatments as compared to control.

#### Keywords

NAA *vinca rosea*,  
(cv. *Catharanthus  
caramel*) growth  
and yield

#### Article Info

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### Introduction

The plant *Vinca rosea* Linn (periwinkle) is an apocynaceous native to Europe, North West Africa and South West Asia. The plants are hardy and it can be grown in any type of soil. They are propagated from seeds or stem, including tip cutting. Ever-blooming, pubescent herb or sub-shrub. In India, the fresh flowers of *Vinca* are valued and used as

loose flowers for religious and some medicinal property. Which has been shown to be a source of many alkaloids. There are 86 alkaloids extracted from the *Vinca* genus Manfred (Hesse, 2002). The chemotherapy agent alkaloid vincristine is extracted from *Vinca rosea/Catharanthus roseus* L. and is used to treat some leukemia's, lymphomas and childhood cancers as well as several other types of cancer and non-cancerous conditions

vinblastine is also a chemical alkaloid analogue of vincristine and is also to treat various forms of cancer. PGRs are chemicals that modify the natural hormonal activity that controls plants growth and development. The key uses of plant growth regulators in ornamental horticulture and floriculture include regulation of plant height, profusion of branching, propagation through cutting, control of flowering, enhancing stress tolerance, increasing postharvest longevity during shipping storing and marketing, besides increasing the display of flowers and potted plants.

The objectives of this study were to study the effect of growth promoters (NAA) on plant growth of *Vinca rosea*. And to study the effect of growth promoters (NAA) on flowering of *Vinca rosea*. Also to study the effect of growth promoters (NAA) on yield of *Vinca rosea*.

### **Materials and Methods**

The present experiment was conducted in the Department of Floriculture and Landscaping, College of Agriculture, Orissa University of Agriculture and Technology, Bhubaneswar during the year 2015-16. Variety name *Catharanthus caramel*. Disease free healthy seeds were sown in the pots for seedling. The 25 days old seedlings were taken for field transplanting, after transplanting the plants were pressed gently and given light irrigation. Planting was done on the 2<sup>nd</sup> May, 2015. Plot with dimension 80X100cm<sup>2</sup> were prepared at a spacing of 40X20cm. Plant growth regulators each at three concentrations viz, NAA (25, 50 and 100ppm) and control (plants sprayed with distilled water) were allocated in randomized block design with three replication with ten plants per replication.. The growth regulators were applied in form of foliar spray, once at 30 days after planting (DAS) seedlings & again after 30days of first

application. Cultural operations like hoeing was manually taken at 30 days interval till the crop in the field. Weeding was done at monthly interval. The experimental plot was kept weed free by manual weeding till the crop in the field were followed as per standard cultural practices. Data on different growth, flowering and yield parameters were recorded on five randomly taken competitive plants for all the observations, i.e. plant height, number of functional leaves per plant, leaf area per plant, number of branches per plant and numbers of plant standing in plot were recorded at 30 days intervals from planting to flower buds. Number of flowers per plant and weight of flowers.

### **Results and Discussion**

The results obtained from the present investigation as well relevant discussion have been summarized under following heads :

#### **Growth characters**

The data on plant height is presented in (Table 1 a, b). A perusal of data in Table 1a shows that maximum plant height was recorded in Increase in plant height as a result of application of NAA has also been reported by Pal *et al.*, (1980) slightly promoted the shoot length in *Jasminum sambac* var. Khoya. In *J. auriculatum*, NAA appreciably reduced the plant growth. In *J. sambac* the number of branches was increased due to NAA applications. Application of NAA at 50 and 100ppm recorded lowest length of primary lateral shoot in *Jasminum multiflorum* (Muruli, 1984). Similar report was observed with NAA at 100 and 200ppm in *Jasminum sambac* (Gowda, 1988).

Zaghloul *et al.*, (1988) and (1989) studied the effects of 2 growth regulators on the rooting of jasmine cuttings. Cuttings of about 20 cm from the middle portion of the plant were

dipped for 2 h in naphthalene acetic acid (NAA) at 0 (control), 500, 750 and 1000ppm or in kinetin at 0, 50, 75 and 1000ppm, and in combinations of NAA and kinetin. All treatments increased the rooting. This experiment was conducted for the optimization of auxin [indole butyric acid (IBA) and naphthalene acetic acid (NAA)] required for the regeneration of Marigold. By dipping the cuttings in higher concentration of NAA showed the maximum increase in roots per plant (123.2) and root size (6.8). Gowda *et al.*, (1990) reported that increased number of laterals, decreased shoot length, number and size of leaves jasmine. The treatment with NAA, GA and IBA together enhanced the vegetative growth and dry yield in *Gloriosa superba* (Mamtha *et al.*, 1993). Singh *et al.*, (1995) showed different effects of different growth hormones on plant height. GA<sub>3</sub> and NAA both increased the plant height at 150 to 300 ppm, while higher level of GA<sub>3</sub> and NAA (450 ppm) significantly depressed the plant height. The hormone treated plants showed early flowering than the control. Marked increase in flower yield due to increased in NAA application in jasmine was reported by Pal *et al.*, (1980). Bhattacharjee, (1983) reported that NAA at 10 ppm induced early

initiation of flower and reduced corolla tube length and obtained largest flower diameter. Muruli (1984) reported that the application of NAA @ 50 and 100 ppm recorded lowest length of primary lateral shoot in *Jasminum multiflorum*. Similar report was observed by Gowda, (1988) with NAA @ 100 and 200ppm in *Jasminum sambac*.

Farooqi *et al.*, (1993) reported that the three concentration of NAA 100, 300 and 400 ppm are significantly different from control for flower size and there is no difference between control and 200 ppm concentration of NAA. By dipping the seedling of Marigold in NAA maximum leaf size (3.20) was recorded at 200 ppm concentration, while minimum leaf size was observed at 400 ppm. Increased in leaves per plant were observed with increase in NAA concentration. Maximum plant height (7.80) was recorded at 100 and 200 ppm NAA concentration while minimum value was (5.0) at 300 ppm concentration. By dipping the seedling in higher concentration of NAA showed the maximum increase in roots per plant (123.2) and root size (6.8). 300 ppm showed maximum value for non-bloom flower and 200 ppm showed the minimum value (3.2).

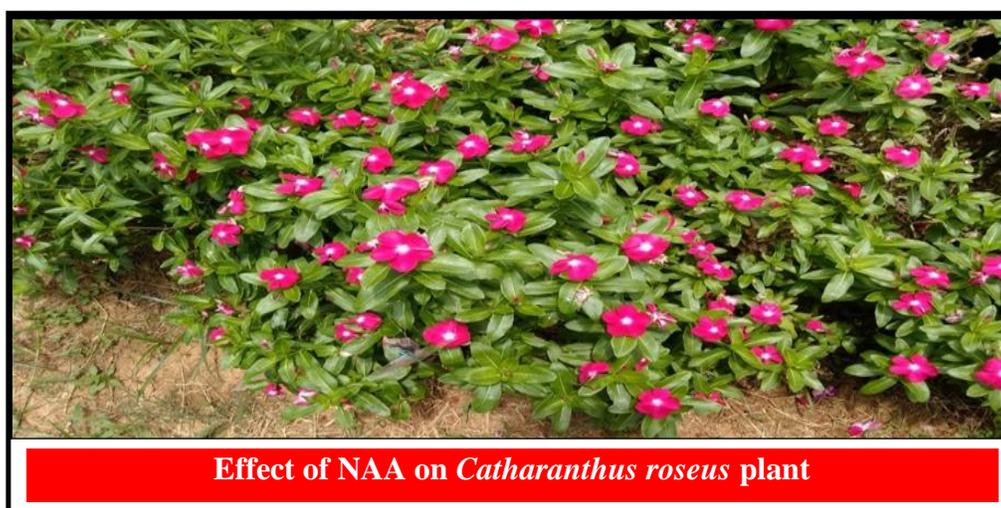
**Table.1** The effect of plant growth regulators on the vegetative growth parameters of *Vinca rosea*

Treatments	Concentration	plant height (cm)	Number of branches per plant	Number of leaves/ Plant	Girth of plant (cm)	Leaf length (cm)	Leaf width (cm)	Leaf Area (cm <sup>2</sup> )	Fresh weight of plant (g)	Dry weight of plant (g)
		<b>150 DAP</b>	<b>150 DAP</b>	<b>150 DAP</b>	<b>150 DAP</b>	<b>150 DAP</b>	<b>150 DAP</b>	<b>150 DAP</b>	<b>150 DAP</b>	<b>150 DAP</b>
T <sub>1</sub>	C- water Spray	32.93	17.33	322.33	2.43	4.23	2.23	9.53	110.36	32.91
T <sub>2</sub>	<b>NAA 25ppm</b>	<b>45.13</b>	<b>18.66</b>	<b>377.66</b>	<b>2.63</b>	<b>5.83</b>	<b>2.33</b>	<b>13.06</b>	<b>168.1</b>	<b>43.12</b>
T <sub>3</sub>	NAA 50ppm	43.76	17.66	364.33	2.66	5.66	2.23	12.44	166.21	42.04
T <sub>4</sub>	NAA 100ppm	39.93	17.66	347.33	2.53	5.16	2.03	11.71	164.06	41.18

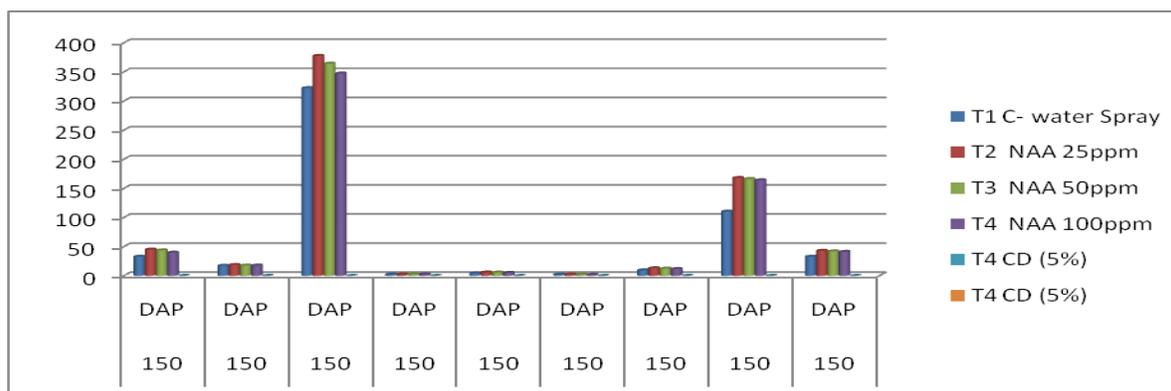
**Table.2** The effect of plant growth regulators on the flowering and yield parameters of *Vinca rosea*

Treatments	Concentration	Days to flower bud initiation to flower opening (days)	Days to flower opening (days)	Duration of flowering (days)	Flower size (cm)	Number of flowers/plant	Weight of single flower (g)	Yield of flowers/plant (g)	Yield of flowers (kg/ha)
		<b>150 DAP</b>	<b>150 DAP</b>	<b>150 DAP</b>	<b>150 DAP</b>	<b>150 DAP</b>	<b>150 DAP</b>	<b>150 DAP</b>	<b>150 DAP</b>
T <sub>1</sub>	C-water Spray	22.33	7.66	4.33	3.96	14.33	0.15	2.15	21.50
T <sub>2</sub>	NAA 25ppm	<b>17.66</b>	<b>5.33</b>	<b>9.33</b>	<b>5.86</b>	<b>18.80</b>	<b>0.17</b>	<b>3.58</b>	<b>35.80</b>
T <sub>3</sub>	NAA 50ppm	19.66	4.66	9.16	4.96	17.13	0.20	3.42	34.26
T <sub>4</sub>	NAA 100ppm	20.66	6.66	9.03	5.06	17.96	0.22	4.39	43.93
	<b>CD (5%)</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>

**Fig.1** Effect of NAA on *Catharanthus roseus* plant growth (Morphological characters of plants)



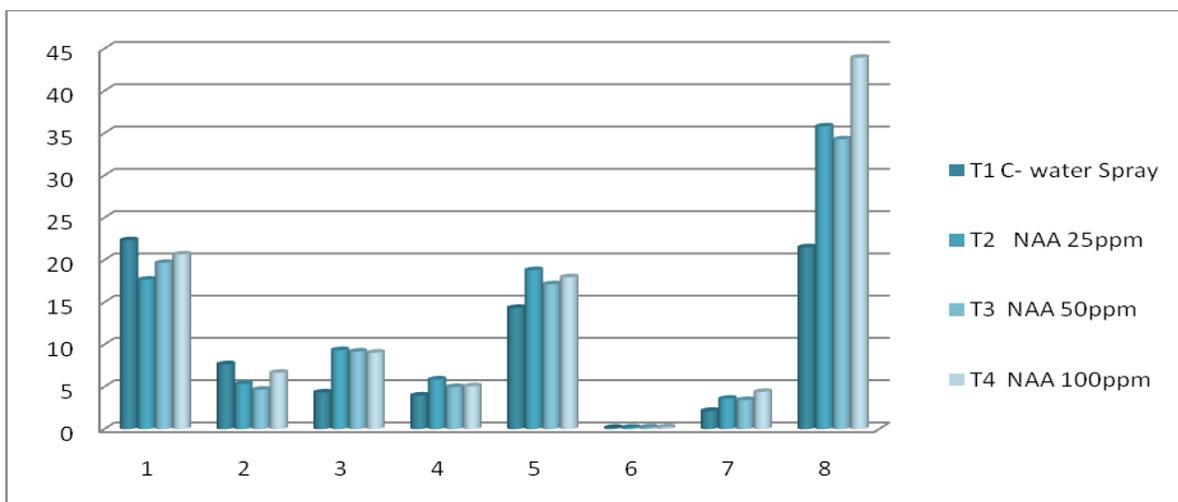
**Fig.2** The effect of plant growth regulators on the vegetative growth parameters of *Vinca rosea*



**Fig.3** Effect of NAA on flower size and number of flowers/plant on *Catharanthus roseus L.*



**Fig.4** The effect of plant growth regulators on the flowering and yield parameters of *Vinca rosea*



Alpha- Naphthalene Acetic Acid (NAA) 25ppm greatly enhanced the plant height, 100ppm greatly enhanced the number of branches/plant and also number of leaves/plant. The plant height was recorded at different intervals of 30, 60, 90, 120 & 150 DAP (35.33cm, 36.26cm, 37.03cm, 42.76cm & 45.13cm) highest number of branches/plant was recorded at different intervals of 30, 60, 90, 120 & 150 DAP (15.33, 16.66, 17.33, 17.66 & 18.66) respectively. Highest numbers of leaves were also registered (312.66, 321.66, 332.33, 337.66 & 377.66). Increase in leaf length, width and leaf areas noted in NAA 25ppm treated plants. Alpha-Naphthalene Acetic Acid at 25ppm gave highest length of leaves (5.83cm) and width of leaf (2.33cm) which was superior to all the treatments experimented. Maximum leaf area of (13.06cm<sup>2</sup>) was recorded with NAA 25ppm.

### **Flowering characters**

A perusal of data in Table b shows that maximum flowering and yield NAA 25, 50 & 100ppm took (5.33, 4.66 & 6.66) mean number of days to flower bud initiation to 1st flower opening. Whereas untreated plants took only 7.66 days. NAA 25, 50 & 100ppm mean yield of flowers kg/ha was recorded (35.80, 34.26 & 43.93).

### **Yield characters**

The results of the study revealed that application of NAA at 25 ppm recorded significantly higher plant height (35.33, 36.26, 37.03, 42.76 and 45.13cm) number of leaves per plant (377.66 nos) at 150 DAS as compared to control which recorded 162.33, 180.66, 228.66, 293.33 and 322.33 nos respectively. Although there was improvement in number of flowers, flower size and duration of flowers under this treatment as compared to control, the

difference was not significant. On the other application of at NAA 100 ppm significantly reduced the time taken for flower bud initiation (20.66days) and days to 1st flowering from the date of bud initiation (6.66days) as compared to control which took 22.33 and 7.66 days respectively for the same.

From the study it could be concluded that the effect of NAA on growth, flowering and yield of *Vinca rosea* showed best response on applying 25 ppm foliar spray on plants, thus it could be concluded that the plants of *Vinca rosea* will show best growth, flowering and yield response under application of 25 ppm NAA foliar spray.

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