



International Journal of Research in Agronomy

E-ISSN: 2618-0618
P-ISSN: 2618-060X
© Agronomy
NAAS Rating: 5.20
www.agronomyjournals.com
2025; 8(4): 09-13
Received: 13-01-2025
Accepted: 17-02-2025

Amita Mary Tirkey
Department of Horticulture, Sam
Higginbottom University of
Agriculture, Technology and
Sciences, Prayagraj, Uttar
Pradesh, India

Vijay Bahadur
Department of Horticulture, Sam
Higginbottom University of
Agriculture, Technology and
Sciences, Prayagraj, Uttar
Pradesh, India

Urfi Fatmi
Department of Horticulture, Sam
Higginbottom University of
Agriculture, Technology and
Sciences, Prayagraj, Uttar
Pradesh, India

Rambharose
Department of Soil Science and
Agricultural Chemistry, Sam
Higginbottom University of
Agriculture, Technology and
Sciences, Prayagraj, Uttar
Pradesh, India

Corresponding Author:
Amita Mary Tirkey
Department of Horticulture, Sam
Higginbottom University of
Agriculture, Technology and
Sciences, Prayagraj, Uttar
Pradesh, India

Effect of nitrogen management through urea and vermicompost on growth and leaf yield of Sadabahar (*Vinca rosea*) var. vinca sunstorm mix under climatic conditions of Prayagraj

Amita Mary Tirkey, Vijay Bahadur, Urfi Fatmi and Rambharose

DOI: <https://www.doi.org/10.33545/2618060X.2025.v8.i4a.2729>

Abstract

Field experiment were conducted in the field of Horticulture in Sam Higginbottom University of Agriculture Technology and Sciences, during kharif season from July to October to study the Effect of Nitrogen Management Through Urea and Vermicompost On Growth and Leaf yield of Sadabahar (*Vinca rosea*) Var. Vinca sunstorm mix Under Climatic Conditions of Prayagraj. Sadabahar seedlings were sown in poly house in month of July followed by transplantation into main field. In month of August. Nitrogen, Phosphorus and Potassium (30,50,40 kg-ha) and vermicompost in three doses of (2.5, 5.0, 7.5 and 10) Kg/tonnes were given as per recommendations. Several parameters like Plant Height, Diameter of Flowers, Number of Leaves, Number of Branches, Number of Flowers, Number of Petals, Internodal Length of Leaves, Fresh Weight of Plant, Dry Weight of Plant, Fresh Weight of Shoot as well as Dry Weight of Shoot were determined. With the application of nitrogen and vermicompost, the present study reveals that crop *Vinca rosea* requires complete fertilizer having nitrogen as well as vermicompost as predominant constituent since it has a predominant influence on the overall development and growth. From this investigation it is concluded that treatment with T₁₄ -100% N through urea +vermicompost @10t/ha+ full PK was found to be most significant over rest of other treatments in relation to growth and leaf yield.

Keywords: Nitrogen management, urea, vermicompost

Introduction

Vinca rosea is a tropical perennial plant, native to Madagascar and belonging to the Apocynaceae family. Presently, it is grown in many tropical and subtropical regions. The main reason of the great interest in *Vinca rosea* is due to wider adaptability to growth throughout the year and its perennial nature. It is a shrub that grows up to 2 feet in height containing dark green leaves. Its flowers comprises of several colours namely dark pink, light pink, purple, dark red and white clour flowers. It consist of several medicinal property. The stems, leaves and roots are used in Ayurvedic medicine. It is used for treatment of Diabetes, Malaria, Leukemia and Hodgkin's disease and most importantly for treatment of Cancer. It also helps in controlling nose bleed, bleeding gums and sore throat. More than 100 Alkaloids are present in Sadabahar plant and some famous alkaloids are vincristine, Vinblastine and Vincamine. Vincamine Alkaloids helps in keeping blood thin and has memory enhancing property. It is therefore useful in treating Dementia especially vascular dementia. It also has traditional folk medicinal properties like juice extracted from leaves are used for treating bee wasp stings.

Materials and Methods

Entire experiment was conducted in the Department of Horticulture, Sam Higginbottom University of Agriculture Technology And Sciences, Prayagraj, during July, 2024 to October, 2024. The experimental field is situated on the left side of Prayagraj- Rewa Road, close to the river Yamuna, and is approximately 7 km from Prayagraj city. The data will be recorded using Randomised Block design (RBD) during this investigation. In RBD, we take common difference (C.D.) value between two groups that is significant and non-significant values using ANNOVA

variance.

Nursery preparation

Seeds were collected from seed company namely Syngenta located at New Delhi Afterwards collected seeds were soaked in water one day prior to sowing for better germination. Before sowing, beds were prepared inside poly house then seeds were sown. After sowing, seeds were irrigated with water. After 4-5 days germination was noticed resulting in growth of plant saplings. Plant saplings were covered with polythene sheets till it achieved certain height and irrigated with help of rosette can. Meanwhile fertiliser mancozeb was sprayed over plant saplings @ 2gram/liter to protect them from fungicidal attack due to presence moisture in rainy season. After 45 days in the poly house, plants were ready for transplantation. In month of August, Sadabahar plants were transferred to the main field in the evening where 3 plants were planted in a row and in total 9 plants were planted in each plot followed by irrigation through rosette can during morning and evening time. 3 times irrigation were done and accordingly nitrogen, phosphorus and potassium were given in doses 30:50:40 and Vermicompost @ 2.0, 5.0, 7.5 and 10 t ha⁻¹ were given.

Land preparation

The experiment included three levels of Nitrogen, Phosphorus and Potassium three levels of NPK (0, 50, & 100% dosage) with (30,50,40 Kg t/ha) and vermicompost in three doses (2.5, 5.0, 7.5 and 10Kg/ tonnes). Fertiliser were added in three portions, the first was given after 2 months in month of September while the second portion and third portion were given at gap of 15 days interval. In order to obtain field free from weeds hand weeding was done accordingly and for proper growth of plants, field were irrigated twice in a day during morning and evening. The 16 treatments were arranged in randomized block design (RBD) with 3 replications. With experimental unit area of plot size 2m x 1m with 68 number of plots. The following parameters were recorded during investigation that were Plant height, diameter of flowers, Number of leaves, Number of branches, number of flowers, number of petals, inter nodal length of leaves, Fresh weight of plant, Dry weight of plant, Fresh weight of shoot as well as Dry weight of shoot were determined. ANOVA analysis was used for comparison OF various treatment by calculationg F-test, S.Ed. value along with that C.D. value was calculated for evaluating the difference

between two groups by taking out mean.

Agroclimatic condition

Geographically, Prayagraj is situated at an elevation of 78 meters from mean sea level in the South-Eastern part of Uttar Pradesh. It lies between the parallels of 24° 77' and 25° 47' north latitudes and 81° 19' and 82° 21' east longitudes. The area of Prayagraj district comes under agro climatic zone V (Upper Gangetic Plain region) and sub-zone of Central Plains. The climate ranges from dry sub-humid to semi-arid and the soil is alluvium calcareous sandy loam. The district experiences average maximum temperature ranges between 43°- 47°C which may go as high as 48°C during peak summers (May-June). The minimum average temperature is 2-4°C, which may fall as low as 1°C during peak winter months (December-January) The average rainfall of the district is 960 mm and the monsoon season is spread between July-October.

Techniques of analysis

1. Soil Sampling

The soil sample was collected from different places of the experimental field from the surface to 12-15 cm depth. These soil samples were mixed together, air dried, powdered and the thoroughly mixed. A representative soil sample of five gram for each and every analysis was drawn and subjected to mechanical and chemical analysis.

2. Physico-chemical properties of soil

The experimental site was a fairly level land with sandy loam soils of uniform fertility status with low clay and high sand percentage. The soil sample were collected at random spots from depth of 0-30 cm. and the soil was analysed for pH, electrical conductivity (EC), organic carbon, available nitrogen, available phosphorus, and available potassium at Allahabad and are presented in Table 1. And 2.

Tables 1: Physical properties of soil

S. No.	Particulars	Value (0-30 cm depth)
1.	Sand	60.60
2.	Silt	22.41
3.	Clay	21.30
4.	Bulk Density	1.64
5.	Textural Class	Sandy Loam

Table 2: Chemical properties of soil

S. No.	Particulars	Value (0-30 cm depth)	Method Adopted
1.	Soil pH	7.2	Digital pH meter (M.L. Jackson)
2.	Organic Carbon (%)	0.4	Wet method (Walkely and Black, 1934)
3	Available Nitrogen (N)	250 kg/ha	Alkaline permanganate method (Subaiah & Asija, 1956)
4	Available Phosphorus (P)	135 kg/ha	Calorimetric method (Olson <i>et al.</i> , 1954)
5	Available Potash (K)	344 kg/ha	Flame Photometric method (Jackson, 1967)

Treatment combination

T₀ as control Vermicompost @2.5 t ha⁻¹ T₁ as Vermicompost @2.5 t ha⁻¹ T₂, as Vermicompost @5.0 t ha⁻¹ T₃ as vermicompost @7.5 t ha⁻¹ And T₄ as Vermicompost@10 t ha⁻¹, T₅ as 50% N through Urea + Full Pk, T₆ as 50% N through Urea +Vermicompost@ 2.5 t ha⁻¹+ Full Pk, T₇ as 50% through Urea +Vermicompost@ 5.0 t ha⁻¹+ Full Pk, T₈ as 50% N through Urea +Vermicompost@ 7.5 t ha⁻¹+ Full Pk, T₉ as 50% N through Urea +Vermicompost@ 10t ha⁻¹+ Full Pk, T₁₀ as 100% N through Urea + Full Pk, T₁₁ as 100% N Through Urea + Vermicompost@ 2.5 t ha⁻¹+ Full Pk, T₁₂ as 100%50% N

through Urea +Vermicompost@ 5.0 t ha⁻¹+ Full Pk, T₁₃ 100% N through Urea +Vermicompost@ 7.5 t ha⁻¹+ Full Pk, T₁₄ as 100% N through Urea +Vermicompost@ 10t ha⁻¹+ Full PK.

Result and Discussion

All the growth attribute characters were studied viz, Plant height(cm), Number of flowers, Number of leaves, Number of petals, diameter of flower, number of branches, internodal length of leaves(cm), fresh weight of leaves(g/plant), dry weight of leaves(g/plant), fresh weight of shoot(g/plant) and dry weight of shoot(g/plant) were recored at 30.60 and 90 days after planting

gives in table the treatments obtained and mentioned below and result are discussed In light of experiment.

Plant height (cm)

Significantly, the maximum plant height was observed in T₁₄ - 100% N through Urea + Vermicompost @ 10t/ha +Full PK (30.56) followed by T₁₃ - 100% N through Urea + Vermicompost @ 7.5t/ha +Full PK (30.32) And minimum was reported in treatment T₀ under Control (44.83).

This might be due to positive effects of macronutrients that serve a critical function in plant development and growth. They serve a variety of purposes, from structural components to redox-sensitive agents. In general, applying macronutrients boosts crop growth, and leaf yield.

Nitrogen is necessary for sufficient proportions for plant growth and yield, since it accounts for 1.5 2.0 percent of plant dry matter and around 16 percent of total plant protein.

Number of leaves

Significantly, the maximum Number of leaves was observed in T₁₄ - 100% N through Urea + Vermicompost @ 10t/ha +Full PK (47.77) followed by T₁₃ - 100% N through Urea + Vermicompost @ 7.5t/ha +Full PK (47.56) And minimum was reported in treatment T₀ under control (7.34).

This might be due to positive effects of Nitrogen that in vegetative growth of plant. Plant development, dry matter build-up, and finally a bigger number of leaves may come from an appropriate and balanced supply of nutrients, increased uptake, and assimilation as compared to no fertilization, reported comparable results.

Number of branches

Significantly, the maximum number of branches was observed in T₁₄ - 100% N through Urea + Vermicompost @ 10t/ha +Full PK (15.35) followed by T₁₃ - 100% N through Urea + Vermicompost @ 7.5t/ha +Full PK (15.27) And minimum was reported in treatment T₀ under control (13.10).

This may be due to positive effects of nitrogen which is essential for development. It is reported in findings where, found out that 100 kg nitrogen per hectare produced the most number of branches in calendula

Number of flowers

Significantly, the maximum number of flower was observed in T₁₄ - 100% N through Urea + Vermicompost @ 10t/ha +Full PK (28.52) followed by T₁₃ - 100% N through Urea + Vermicompost @ 7.5t/ha +Full PK (27.21) and minimum was reported in treatment T₀ - under control (1.03).

This may be due to positive effects of vermicompos that was

supplied to soil. This is reported in findings where part of the ground soil was replaced by different amounts vermicompost of different origins leading to increased germination and flowering in laboratory and greenhouse condition in a vast variety of ornamental plants and vegetables such as marigold, tomato and pepper.

Diameter of flower (cm), length of corolla tube(cm) and number of petals

Significantly, the maximum diameter of flower, Length of corolla tube and Number of petals were recorded in treatment T₁₄ - 100% N through Urea + Vermicompost @ 10t/ha +Full PK (2.34 cm), (2.55), (5) followed by T₁₃ - 100% N through Urea + Vermicompost @ 7.5t/ha +Full PK (2.21), (2.46), (5) and minimum was reported in treatment T₀ under control (1.02), (1.5), (3.47).

This might be due to positive effects of vermicompost that as supplied to plants. Greater proportions of vermicomposts substituted in growth media have not improved plant growth as much as smaller proportions enhanced development.

Internodal length of leaves (cm), fresh and dry weight of leaves (g/plant)

Significantly, the maximum Internodal length of leaves, Fresh weight of leaves and Dry weight of leaves were recorded in treatment T₁₄ - 100% N through Urea + Vermicompost @ 10t/ha +Full PK (1.91), (36.08), (4.21) followed by T₁₃ - 100% N through Urea + Vermicompost @ 7.5t/ha +Full PK (1.85), (35.64), (4.19) and minimum was reported in treatment under control T₀ - control (1.37), (25.14), (3.34).

Fresh weight and dry weight of shoot(g/plant) and length of main root(cm)

Significantly, the maximum Fresh weight of shoot, Dry weight of shoot, Length of main root were recorded in the treatments T₁₄ - 100% N through Urea + Vermicompost @ 10t/ha +Full PK (79.99), (33.68), (20.49) followed by T₁₃ - 100% N through Urea + Vermicompost @ 7.5t/ha +Full PK (79.61), (33.52), (20.33) and minimum was reported in the treatment T₀ - under control T₀ (71.06), (29.33), (16.73).

This might be due to positive effects of nitrogen that enhanced overall development. This was reported in findings where insufficient nitrogen availability had a negative impact on crop morphology, growth, and biomass.

In *Callistephes chinensis*, reported that raising nitrogen levels increased flower output, fresh weight, and dry weight of the plant. Hence it is concluded that T₁₄ treatment is the most significant among others.

Table 1: Growth parameters affected by various treatments

Treatments	Plant height (Cm)	No. of leaves	No. of branches	No. of flower	Diameter of flower (cm)	Length of corolla tube (cm)	No. of petals	Internodal length of leaves (cm)	Length of main root (cm)
T0	18.91	44.83	13.1	18.41	1.02	1.5	4	1.37	16.73
T1	20.58	45.67	13.64	20.21	1.1	1.65	5	1.45	16.94
T2	20.94	46.71	13.8	20.49	1.16	1.17	5	1.51	17.05
T3	22.72	46.05	14.07	20.85	1.36	1.8	5	1.55	17.77
T4	25.38	46.48	14.33	21.67	1.42	1.9	5	1.6	18.25
T5	25.93	46.75	13.56	22.59	1.54	2.05	5	1.62	16.89
T6	26.44	46.79	14.33	22.79	1.61	2.08	5	1.65	18.25
T7	26.62	46.89	14.41	23.54	1.75	2.15	5	1.68	18.65
T8	27.72	47.01	15.07	23.99	1.89	2.18	5	1.71	19.93
T9	27.77	47.05	15.19	24.29	1.99	2.18	5	1.74	20.17
T10	28.64	47.18	14.53	24.78	2.03	2.33	5	1.79	18.89

T11	29.48	47.22	14.81	25.69	2.11	2.4	5	1.81	19.45
T12	29.13	47.34	14.89	26.23	2.17	2.45	5	1.84	19.61
T13	30.32	47.56	15.27	27.21	2.21	2.46	5	1.85	20.33
T14	30.56	47.77	15.35	28.52	2.34	2.55	5	1.91	20.49
F- test	S	S	S	S	S	S	S	S	S
S.Ed.	0.52	0.7	0.37	0.43	0.37	0.26	0.3	0.005	20.33
C.D	1.04		0.74	0.85	0.74	0.53	0.59	0.1	0.92

Table 2: Fresh Weight and Dry Weight of Leaves, Fresh Weight and Dry Weight of Shoot

Treatment	Fresh weight of leaves (g/plant)	Dry weight of leaves (g/plant)	Fresh weight of shoot (g/plant)	Dry weight of shoot (g/plant)
T0	25.14	3.34	71.06	29.33
T1	25.74	3.74	71.06	30.03
T2	26.18	3.76	71.82	30.24
T3	26.62	3.78	73.53	30.96
T4	28.6	3.87	74.67	31.44
T5	29.92	3.93	71.44	30.08
T6	29.92	3.93	74.67	31.44
T7	31.02	3.98	75.62	31.84
T8	31.68	4.01	78.66	33.12
T9	33.22	4.08	79.23	33.36
T10	33.66	4.1	76.19	32.08
T11	34.54	4.14	77.52	32.64
T12	35.2	4.17	77.90	32.80
T13	35.64	4.19	79.61	33.52
T14	36.08	4.21	79.99	33.68
F test	S	S	S	S
S.Ed.	0.68	0.03	1.17	0.51
C.D	1.35	0.06	2.35	1.01

Results and Conclusion

From the present investigation, it is concluded that treatments with T₁₄- 100% N through Urea + Vermicompost @ 10t/ha +Full PK was found to be most significant over all other treatments in relation to growth and leaf yield.

References

- Kohlmüzer S. Alkaloidy *Catharanthus roseus* G. Don nowa grupa związków biologicznie czynnych (Alkaloids of *Catharanthus roseus* (L.) G. Don a new group of biologically active compounds). Post Biochemistry. 1968;14:209-232.
- Pareek SK, Maheshwari ML, Gupta R. Cultivation of periwinkle in North India. Indian Journal of Horticulture. 1985;30(3):9-12.
- Tyler VE. Medicinal plant research: 1953-87. Planta Medica. 1988;54:95-100.
- Boot RG, Mensink M. Size and morphology of root systems of perennial grasses from contrasting habitats as affected by nitrogen supply. Plant and Soil. 1990;129(2):291-299.
- Boot RGA, Mensink M. The influence of nitrogen availability on growth parameters of fast- and slow-growing perennial grasses. Plant and Soil. 1991.
- Ibrahim ME, Habba E, Taraf Sh. NPK and foliar fertilization of *Ocimum basilicum* L. Egyptian Journal of Applied Sciences. 1993;8(12):480-492.
- Moreno PRH, Van der Heijden R, Verpoorte R. Elicitor-mediated induction of isochorismate synthase and accumulation of 2,3-dihydroxybenzoic acid in *Catharanthus roseus* cell suspension and shoot cultures. Plant Cell Reports. 1994;14:188-191.
- DiCosmo F, Miasawa M. Plant cell and tissue culture: alternatives for metabolite production. Biotechnology Advances. 1995;13:425-453.
- Ezz El-din AA. Productivity of *Silybum* plants (*Silybum marianum* L.) as affected by some agricultural treatments in new reclaimed regions. PhD thesis, Faculty of Agriculture, Ain Shams University, Egypt; 1995.
- Pezzuto JM. Plant-derived anti-cancer agents. Biochemical Pharmacology. 1997;53:121-133.
- Snedecor GW, Cochran WG. Statistical Methods. 7th ed. Iowa State University; Ames, Iowa, USA; 1980. p. 507.
- Brand MH. Shade influences plant growth, leaf color, and chlorophyll content of *Kalmia latifolia* L. cultivars. HortScience. 1997;32(2):206-208.
- Dahiya SS. Effect of nitrogen and phosphorus on growth, flowering and yield of marigold (*Tagetes erecta* L.). Environment and Ecology. 1998;16(4):855-857.
- Gupta R. Periwinkle produces anti-cancer drug. Indian Farming. 1977.
- Hameed AS, Sekar K. Effect of graded levels of nitrogen and phosphorus on yield and quality of African marigold (*Tagetes erecta* L.). South Indian Horticulture. 1999;47(1/6):339-341.
- Csizinszky AA. Yield response of herbs to nitrogen and potassium in sand in multiple harvests. Journal of Herbs, Spices and Medicinal Plants. 1999;6(4):11-23.
- Chouhan GS, Joshi Arunabh. Effect of nitrogen, phosphorus and potassium fertilization on yield and quality of ashwagandha (*Withania somnifera*). Indian Journal of Plant Physiology. 2000;8(1):60-62.
- Chauhan SK, Tiwari. Effect of sources and levels of nitrogen on partitioning of Andrographolide in Kalmegh [*Andrographis paniculata* (Burm. f.) Wall. ex Nees.]. South Indian Horticulture. 2003;47(1/6):342-344.
- Hedhili S, Pati PK, Gantet P. Integrating knowledge of transcription factors and cell engineering for modelling *Catharanthus roseus*: prospects and bottlenecks. In: Teixeira da Silva JA, editor. Floriculture, Ornamental and Plant Biotechnology: Advances and Topical Issues. Vol IV. Isleworth, UK: Global Science Books; 2006. p. 243-252.
- Vázquez-Flota F, Miranda-Ham ML. Secondary

- metabolism in *Catharanthus roseus* (Apocynaceae). In: Teixeira da Silva JA, editor. Floriculture, Ornamental and Plant Biotechnology: Advances and Topical Issues. Vol IV. Isleworth, UK: Global Science Books; 2006. p. 529-540.
21. Lata B. Cultivation, mineral nutrition and seed production of *Catharanthus roseus* (L.) G. Don in the temperate climate zone. *Phytochemistry Reviews*. 2007;6:403-411.
 22. Binder BY, Peebles CA, Shanks JV, San KY. The effects of UV-B stress on the production of terpenoid indole alkaloids in *Catharanthus roseus* hairy roots. *Biotechnology Progress*. 2009;25(3):861-865.
 23. Ajaib M, Khan ZUD, Khan N, Wahab M. Ethnobotanical studies on useful shrubs of District Kotli, Azad Jammu & Kashmir, Pakistan. *Pak J Bot*. 2010;42:1407-1415.