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Effect of Biofertilizers on Growth and Flowering of Petunia *(Petunia hybrida L.)*

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ABSTRACT

The present studies were carried out during winter season at the experiment farm of the Department of Horticulture (Floriculture and Landscaping) Allahabad Agricultural Institute–Deemed University, Allahabad (U.P). The experiment was laid out in a completely randomized design with ten treatments combination, replicated thrice in Petunia (*Petunia hybrida*). Treatment combination consisted of use of bio-fertilizers namely VAM, Azotobacter, PSB and Inorganic fertilizers. Treatment consisting of (Azotobacter + VAM + 50% NPK) produced maximum plant height, number of leaves/plant, number of branches/plant and plant spread, where as early bud initiation, number of flowers per plant, duration of flowering and flower size was attained with treatment consisting of PSB+ 50% NPK.

Keywords:
Biofertilizer, growth, Inorganic fertilizer, Petunia

INTRODUCTION

Petunia (*Petunia hybrida)* a member of family Solinaceae is a popular, easy to grow versatile annual with showy flowers. It is grown as half hardy annual with wavy or fringed petals, leaves and stems sticky to touch, and have a distinct odor. Leaf is simple, cauline, opposite, sessile, ovate with multicostate venation. The inflorescence is cymose, solitary and axillary. The hybrids have a remarkable long flowering period.

Fertilization is one of the important aspects in increasing the flower yield of Petunia. After green revolution, the use of chemical fertilizers and pesticides in plant production has increased which pose threat to ecology and environment. Therefore, organic farming is the only solution to this problem. In recent times, biofertilizers have emerged as a supplement to mineral fertilizers and hold a promise to improve the yield as well as the quality of the crop.

Vesicular Arbuscular Mycorrhiza (VAM) and Phosphorus Solubilising Bacteria (PSB) etc are chief microorganisms, which are capable of mobilizing nutritive elements from non usable form to usable form through biological processes (Lin.Suchen et al. 2001) by stimulating plant growth through synthesis of growth promoting substances and results in increased or earlier flowering, growth and yield. Keeping in view the above points the present investigation was conducted to evaluate the effect of biofertilizers and inorganic fertilizers on growth and flowering of *Petunia hybrida*.

MATERIAL AND METHODS

The present investigations were carried out in the pots in the department of Horticulture, Allahabad Agricultural Institute–Deemed University, Allahabad, during the winter season. Allahabad is situated at an elevation of 78 meters from sea level at 25.8°N latitude and 81.5°E longitude. The climate is generally sub-tropical with extremes of summer and winter. The experiment was laid out in a Completely Randomized Design with 10 treatment combinations, replicated thrice with two pots per replication. Treatment combinations consisted of the use of biofertilizers namely, VAM, Azotobacter, PSB and inorganic fertilizers were used. The constituents used for pot mixtures were garden soil 2 parts, sand 1 part and well rotten FYM 1 part and disinfect the mixture with D-M-45 @ 0.5% concentration.Carrier based Biofertilizers were applied @ 10gms/pot for soil inoculation, charcoal and soil were used as carriers.

RESULTS AND DISCUSSION

Results revealed that maximum plant height (12.00cm) was obtained when plants were treated with (VAM+ Azotobacter + 50% NPK) in T_8 followed by T_7 (VAM+ Azotobacter) i.e. (11.6cm) and the minimum plant height (9.4cm) was found with T_1(control). Pooled data analysis for the number of leaves indicates that treatment consisting of T_8 (VAM+ Azotobacter + 50% NPK) resulted in maximum no. of leaves (46.83) and minimum number (27.36) was with T_1 (control). Table 1 indicates that increased no. of branches (22.33) was observed in the treatment T_8 (VAM+ Azotobacter + 50% NPK) and minimum (9.5) in T_1 (control). The increased plant spread was found maximum in T_8 (VAM+ Azotobacter + 50% NPK) and minimum in T_1 (control). This may be attributed to the supply of macro and micro-nutrients, enzymes and growth hormones by VAM. Similar effects of PSB and Azotobacter on tuberose spike length was reported by Swaminathan et al. (1999).

In the present studies growing media containing VAM, Azotobacter, and PSB had increased the plant height could be due to better nutrient uptake, photosynthesis, source sink relation, besides excellent physiological and bio-chemical activities due to presence of VAM, Azotobacter and PSB. Similarly results of increased plant height, number of branches, plant spread with the use of VAM in chrysanthemum cultivars have been reported by Gnanadevi and Haripriya (1999). Santos et al.(1996) reported the Azotobacter inoculated plants show luxuriant vegetative growth. Ivanorv et al.(1992) while working with Lupins, Lin-Suchen et al. (2001) while working with *Eustoma grandiflorum* emphasized that (PSB+ 50% NPK) resulted in earliness in bud initiation and longevity of flower on plant. Gayithri et al. (2004) reported the use of Azotobacter, PSB and vermicompost along with 50% of recommended N,P and 100% K, resulted in better plant growth, higher yield of quality spikes in the production of statice under green house condition.

The bio-fertilizer treated plants significantly influenced the number of days taken for bud initiations minimum 40 days were taken in T_{10} (PSB+ 50 % NPK) for bud initiation and maximum number of days i.e (61.66) were taken by T_1 (control). Biofertilizers stimulated the increase in number of flowers per plant and flower size. The combined treatments of (PSB+ 50 % NPK) with (T_{10}) treatment gave the best response. The increase in number of flowers might be due to the possible role of Azotobacter through atmospheric nitrogen fixation, better root profilation, uptake on nutrients and water, higher leaf number and area, higher photosynthetic activity and enhanced food accumulation which might have resulted in better plant growth and subsequently bigger size of flowers.

Table 1: Effect of Bio-fertilizers on growth and flowering of petunia (*petunia hybrida*).

Treatment	Plant height (cm)	No. of leaves / plant	No. of branches /plant	Plant spread (cm)	Bud initiation (DAP)	No. of flowers / plant	Duration of flowering (No. of days)	Flower size (cm)
T_1 Control	9.4	27.36	9.5	15.23	61.66	94	48.00	6.36
T_2 50%NPK	9.7	30.26	12.0	16.16	58.00	140.00	54.00	6.96
T_3 VAM	10.8	35.5	16.66	23.76	55.00	106.00	57.00	7.5
T_4 VAM+50%NPK	11.36	37.26	18.83	25.76	54.00	112.66	59.00	8.43
T_5 Azotobacter	10.2	31.26	16.5	22.2	58.00	110.00	50.33	7.13
T_6 Azotobacter + 50% NPK	11.00	36.13	17.83	25.13	47.66	135.00	65.66	9.16
T_7 Azotobacter + VAM	11.6	40.00	20.33	26.3	52.00	121.00	60.33	8.43
T_8 Azotobacter+VAM+50 %	12.0	46.83	22.33	28.36	45.00	147.66	70.33	10.1
NPK	9.96	30.6	12.66	21.16	49.00	127.00	63.66	9.06
T_9 PSB	10.46	34.00	16.66	23.03	40.00	151.6	72.33	10.56
T_{10} PSB + 50% NPK	0.15	3.77	2.92	1.26	1.91	13.32	2.91	0.23
Pooled C.D at 5%								

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