



International Journal of Research in Agronomy

E-ISSN: 2618-0618

P-ISSN: 2618-060X

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www.agronomyjournals.com

2024; 7(11): 341-346

Received: 09-08-2024

Accepted: 15-09-2024

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Effect of growing media and jeevamrit spray on flowering parameter in petunia (*Petunia hybrida*)

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DOI: <https://doi.org/10.33545/2618060X.2024.v7.i11e.1996>

Abstract

The present investigation entitled, “Effect of growing media and jeevamrit spray on petunia (*Petunia hybrida*)” was carried out at department of Floriculture and Landscape under shadenet conditions at Pt. K.L.S. College of Horticulture and Research Station, Rajnandgaon (C.G.) during in year 2022-23. The investigation was conducted in Factorial completely randomized design (FCRD) with 12 treatment and 3 replication. There were 2 factors, first factor with 4 levels of growing media combination. viz. (M1) Soil + rice husk + FYM (1:1:1), (M2) Soil + rice husk + vermicompost (1:1:1), (M3) Soil + cocopeat + FYM (1:1:1), (M4) Soil + cocopeat+ vermicompost (1:1:1) and the second factor with 3 level of jeevamrit viz. (J1) Water, (J2) Spray application 5% jeevamrit at fortnightly and (J3) Spray application 10% jeevamrit at monthly interval.

The observations were recorded on various flowering parameters like earliest days taken for bud emergence (47.70 days), maximum No. of bud per plants (17.96), earliest No. of days taken for 1st flower opening (58.16), duration of flower (36.23 days), maximum flower diameter (6.61 cm), survival percentage (%) (94.60%) and earliest 50% flowering (68.30 days) was obtained in the plants grown in M4 [Soil + cocopeat + vermicompost (1:1:1)] and maximum flower diameter (6.61 cm) was found in M3 [soil + cocopeat + FYM].

In case of jeevamrit (J2) spray application 5% of jeevamrit at fortnightly and (J3) spray application 10% jeevamrit at monthly was recorded, earliest days taken for bud emergence (49.08 days), maximum No. of bud per plants (16.96), earliest No. of days taken for 1st flower opening (59.65), duration of flower (days) (33.98), maximum flower diameter (6.29 cm), survival percentage (%) (91.85%) and earliest 50% flowering (70.72 days) was observed in spray application 10% jeevamrit at monthly interval. The treatment combination (M4J3) soil + cocopeat + vermicompost (1:1:1) + spray application 10% jeevamrit at monthly in improving plant growth, early flowering and yield in petunia. Their combined application is recommended for higher productivity and profitability in petunia cultivation.

Keywords: Petunia, growing media combination, jeevamrit application, Rice husk, FYM, Vermicompost, Cocopeat

1. Introduction

Petunia × hybrida Vilm. a member of the Solanaceae family, is one of the most important annual flowers. South America is where the petunia originated. The genus *Petunia*, which includes over 25 species of various kinds, including synthetic garden plant species, is one of the most widely used genera for the production of new variants. It has been a commercially significant annual flower. However, research has shown that there are currently only 14 species recognised in the genus *Petunia*. Due to a natural cross between two wild species, *Petunia axillaris* Lam. And *P. violacea* Lindl. the most popular petunia, *Petunia × hybrida*, was created and has a high aesthetic value (Cantor *et al.* 2015)^[6].

The petunia blooms in the winter and is not tolerant of extreme temperatures or excessive shadow. It needs at least five hours of sunlight every day to thrive and it also needs damp soil and low air humidity. Despite being considered perennials in general, petunia are grown as annuals for commercial purposes (Cantor *et al.* 2015)^[6]. Compact and herbaceous, petunias have a straggling and decumbent habit, are pubescent and sticky and produce colourful eye-catching flowers (Bailey (1951)^[4]. Described the leaves as simple, alternating and whole. With a

funnel-shaped corolla and five lobed calyces, flowers are solitary, terminal, axillary and pedicellate, displaying zygomorphic symmetry (Knapp, 2002)^[15].

Based on their growth habit and blossom size, petunias are divided into four categories: grandiflora, floribunda, multiflora and milliflora type. Depending on the kind, petunia plants can range in height from 20 to 50 cm. Petunia cultivars are further separated into two primary groups based on horticultural and aesthetic characteristics: compact and upright (with a height range of 15–25 cm) and sprawling long stemmed balcony type (15–46 cm). Several new petunia cultivars have also been created by diverse breeding initiatives and they differ significantly in terms of forms, colour and growth patterns (Karre *et al.* 2022)^[13].

As per National Horticulture Database published by National Horticulture Board, during 2021-22 the area under floriculture production in India was 283 thousand hectares with a production of 2295 thousand tonnes loose flowers and 833 thousand tonnes cut flowers (Anonymous 2022)^[2]. Floriculture is now commercially cultivated in several states with Karnataka (15.85%), TamilNadu (15.16%), Madhya Pradesh (13.66%) and West Bengal (10.61%) having gone ahead of other producing states like Mizoram, Gujarat, Andhra Pradesh, Orissa, Jharkhand, Haryana, Assam and Chhattisgarh. Area under flower cultivation is Chhattisgarh state with the formation of new state the demand of flowers is increasing day-by-day, to meet out the growing demand of flowers it is essential to promote commercial floriculture among the farmers. The present area under floriculture in the state is 13,089 ha. with the production of 2,29,868 MT. approximately in the year 2020-21 (Anonymous, 2021)^[1]

2. Materials and Methods

The experiment was conducted to study the effect of different growing media and jeevamrit applications on flowering of petunia (*Petunia hybrida*) variety Super cascade pink during 2022-23 at Department of Floriculture and Landscape, Pt. K.L.S. College of Horticulture & Research Station, Rajnandgaon, Chhattisgarh, under shade net conditions. The experimental design was Factorial Completely Randomized Design with 12 treatments comprising of 4 growing media viz. (M₁) Soil + Rice husk + FYM (1:1:1), (M₂) Soil + Rice husk + vermicompost (1:1:1), (M₃) Soil + cocopeat + FYM (1:1:1) and (M₄) Soil + cocopeat + vermicompost (1:1:1) and 3 levels of jeevamrit viz. J₁ (Water), J₂ (Spray application 5% jeevamrit at fortnightly) and J₃ (Spray application 10% jeevamrit at monthly) and replicated thrice. Observation parameters likes days taken of bud emergence, No. of bud per plants, No. of days taken for 1st flower opening, duration of flower (days), flower diameter (cm), survival percentage and 50% flowering (days)

3. Results and Discussion

Days taken of bud emergence

Factor (A): (Growing Media Combination)

The significantly early days taken of bud emergence (47.70) recorded in treatment M₄ [Soil + cocopeat + vermicompost (1:1:1)], which was followed by the treatment M₃ [Soil + cocopeat + FYM (1:1:1)] and M₂ [Soil + rice husk + vermicompost (1:1:1)] of (49.06) and (51.99). In contrast, the significantly late days taken of bud emergence of (54.78) was observed in the treatment M₁ [Soil + rice husk + FYM (1:1:1)]. The combination of soil, cocopeat and vermicompost

resulted in the earliest bud emergence possibly due to cocopeat provide better aeration and drainage in the media and Cocopeat improves soil structure which would have facilitated quicker establishment of plant emergence along with bring down the pH, to optimum level for the availability of macro and micro nutrients uptake by plant root system with the help of improvement water holding capacity and higher photosynthetic activity resulted in better C:N ratio of petunia buds compared to other media combination. These outcomes are consistent with findings of Venkatesh *et al.* (2021)^[27] in petunia and Mandavi *et al.* (2023)^[17] in china aster.

Factor (B): Jeevamrit Application

The significantly early days taken of bud emergence (49.08) observed in treatment J₃ (Spray application 10% jeevamrit at monthly), which was followed by the treatment J₂ (Spray application 5% jeevamrit at fortnightly) that produced a days taken of bud emergence of (50.40). In contrast, the significantly late days taken of bud emergence of (53.17) was observed in the treatment J₁ (Water). The application of 10% jeevamrit spray monthly resulted in the fastest bud emergence compared to other water application. The monthly spray of 10% jeevamrit most effectively supplied nutrients and microbial elements to the soil medium, thereby facilitating speedier sprouting and emergence of buds in petunia plants. Similar study were also observed by Jehoshaphat *et al.* (2017)^[12] in gladiolus.

Interaction (M x J)

The interaction effect of jeevamrit spray on petunia was found to be significantly lowest in treatment M₄J₃ for days taken of bud emergence (46.96), which was followed by treatments M₄J₂ and M₃J₃ that produced days taken of bud emergence of (47.09 and 47.41). In contrast, the highest days taken of bud emergence of (56.70) were observed in the treatment M₁J₁. The combination of Soil + Cocopeat + Vermicompost growing medium with 10% monthly jeevamrit spray resulted in significantly earliest bud emergence in petunia. The higher nutrient accumulation may be linked to the plant's strong development, which demonstrated a balanced nutritional level when combined with bio stimulants. In the end, it produced a better sink for quicker photosynthesis mobilisation and an earlier transition from the vegetative to the reproductive phase. For all vegetative and reproductive growth, the biodynamic amendment (Jeevamrit). Similar results finding by Singh *et al.* (2015)^[21] in marigold.

No. of bud per plants

Factor (A): (Growing Media Combination)

The treatment M₄ [Soil + cocopeat + vermicompost (1:1:1)] produced significantly highest no. of bud per plants of (17.96), which was followed by the treatment M₃ [Soil + cocopeat + FYM (1:1:1)] and M₂ [Soil + rice husk + vermicompost (1:1:1)] that produced a no. of bud per plants of (16.91 and 15.42). In contrast, the lowest no. of bud per plants of (14.23) was observed in the treatment M₁ [Soil + rice husk + FYM (1:1:1)]. The combination of soil, cocopeat and vermicompost in equal ratios in treatment M₄ provided the best balance does of macro and micro nutrients, aeration and water retention capacity for petunia plants. This would have facilitated better vegetative growth and highest bud formation compared to the other media combinations tested. Similar result was also found by Sharma *et al.* (2020)^[20] in petunia.

Factor (B): Jeevamrit Application

The treatment J₃ (Spray application 10% jeevamrit at monthly) produced significantly highest no. of bud per plants of (16.96), which was followed by the treatment J₂ (Spray application 5% jeevamrit at fortnightly) that produced a no. of bud per plants of (16.56). In contrast, the lowest no. of bud per plants of (14.87) was observed in the treatment J₁ (Water). The significant increase in number of bud per plant in jeevamrit spray might be due to the reason that nitrogen, phosphorus and potassium are directly available to the plants and jeevamrit also increases beneficial microorganisms in the soil in comparison to water spray. Number of bud per plant may have increased with the increase in number of branches per plant as well as due to the effect of inoculants capable of providing phosphorous useful in increasing the number of bud per plant. The increase in number of flowers per plant in marigold was also observed with jeevamrit treatment Singh *et al.* (2015)^[21] and Choudhary *et al.* (2021)^[7] in marigold.

Interaction (M x J)

Interaction effect of jeevamrit spray on petunia was found significantly highest in treatment M₄J₃ for no. of bud per plants of (18.81), which was followed by the treatment M₄J₂ and M₃J₃ that produced a no. of bud per plants of (18.46 and 17.80). In contrast, the lowest no. of bud per plants of (13.61) was observed in the treatment M₁J₁. The media contain Soil + Cocopeat + Vermicompost along with 10% monthly jeevamrit foliar sprays resulted in the significantly highest number of buds per petunia plant. The balanced nutrition from the vermicompost-enriched medium coupled with growth enhancers in jeevamrit likely stimulated axillary bud formation and proliferation resulted in higher number of buds per plant. In contrast, the Soil + Rice husk + FYM medium with just water spray had the lowest bud numbers indicating suboptimal nutrition for flowering. Similar findings were also made by Sahu *et al.* (2023)^[19] and Sharma *et al.* (2020)^[20] in petunia.

No. of days taken for 1st flower opening**Factor (A): (Growing Media Combination)**

The data showed that the significantly early no. of days taken for 1st flower opening (58.16) was recorded in treatment M₄ [Soil + cocopeat + vermicompost (1:1:1)], which was significantly followed by the treatment M₃ [Soil + cocopeat + FYM (1:1:1)] and M₂ [Soil + rice husk + vermicompost (1:1:1)] of (59.61) and (61.96). In contrast, the significantly late No. of days taken for 1st flower opening of (63.98) was observed in the treatment M₁ [Soil + rice husk + FYM (1:1:1)]. The growing medium with Soil + Cocopeat + Vermicompost (1:1:1) resulted in significantly earliest first flower opening in petunia compared to other media combinations. The balanced nutrition and ideal physicochemical properties of this mix likely promoted faster transition to reproductive phase. In contrast, Soil + rice husk + FYM had delayed flowering indicating sub optimal nutrition and growth. The results of this investigation corroborate by the Venkatesh *et al.* (2021)^[27] and Sharma *et al.* (2020)^[20] in petunia.

Factor (B): Jeevamrit Application

The data showed that the significantly early no. of days taken for 1st flower opening (59.65) was recorded in treatment J₃ (Spray application 10% jeevamrit at monthly), which was followed by the treatment J₂ (Spray application 5% jeevamrit at fortnightly) that produced a no. of days taken for 1st flower opening of (60.34). In contrast, the significantly delay no. of days taken for

1st flower opening of (62.80) was observed in the treatment J₁ (Water). 10% monthly jeevamrit spray ensured optimum nutrition, aeration, water retention and growth promoting factors, thereby facilitating significantly faster vegetative growth and earliest flowering initiation in petunia. Along the monthly spray of 10% jeevamrit organic fertilizer effectively supplied nutrients, micronutrients and plant growth regulators that most accelerated the flowering process in petunia as opposed to water alone through earlier bloom formation. Similar result was also found by Venkatesh *et al.* (2021)^[27] in petunia.

Interaction (M x J)

Interaction effect of growing media and jeevamrit spray on petunia was found non-significant for no. of days taken for 1st flower opening.

Duration of flower (days)**Factor (A): (Growing Media Combination)**

The treatment M₁ [Soil + rice husk + FYM (1:1:1)] resulted in significantly lowest duration of flower of (28.32), which was followed by the treatment M₂ [Soil + rice husk + vermicompost (1:1:1)] and M₃ [Soil + cocopeat + FYM (1:1:1)] that produced a duration of flower (days) of (30.50) and (33.65). In contrast, the significantly highest duration of flower (days) of (36.23) was observed in the treatment M₄ [Soil + cocopeat + vermicompost (1:1:1)]. The treatment soil, cocopeat and vermicompost in 1:1:1 ratio resulted in the longest flowering duration of petunia due to cocopeat provide good aeration and increase water holding capacity and vermicompost provide balance does of macro and micronutrients provided by the mixture which enhanced growth and development of plant leading to extended flowering stage. Similar results were also observed by Kala in chrysanthemum and Moghadam and Shoor (2013)^[18] in petunia.

Factor (B): Jeevamrit Application

The treatment J₁ (Water) resulted in significantly lowest duration of flower (days) of (29.68), which was significantly followed by the treatment J₂ (Spray application 5% jeevamrit at fortnightly) that produced a duration of flower (days) of (32.87). In contrast, the significantly highest duration of flower (days) of (33.98) was observed in the treatment J₃ (Spray application 10% jeevamrit at monthly). Jeevamrit is rich in beneficial microorganism that support the expansion of soil biomass and microbial count. These include actinomycetes, lactic acid bacteria and yeast. Further, it makes minerals in the soil easier to access and absorb. Jeevamrit has a lot of growth-promoting hormones like GA₃, IAA and Cytokinin, which helped to prolong the flowering time. The results shown here correspond with research finding reported by Gore and Sreenivasa (2011)^[9] in tomato.

Interaction (M x J)

Interaction effect of growing media and jeevamrit spray on petunia was found non-significant for duration of flower (days).

Flower diameter (cm)**Factor (A): (Growing Media Combination)**

The significantly highest flower diameter (cm) was in treatment M₃ [Soil + cocopeat + FYM (1:1:1)] of (6.61 cm), which was followed by the treatment M₄ [Soil + cocopeat + vermicompost (1:1:1)] and M₂ [Soil + rice husk + vermicompost (1:1:1)] that produced a flower diameter (cm) of (6.33 cm and 5.81 cm). In contrast, the lowest flower diameter (cm) of (5.46 cm) was observed in the treatment M₁ [Soil + rice husk + FYM (1:1:1)]. The balanced supply of nutrients and water retention in the soil,

cocopeat and FYM media of M₃ would have ensured optimal plant growth and development resulting in the production of largest flowers compared to other media combinations tested due to improved physiological and biochemical processes. Similar result was also reported by Khandaker *et al.* (2018)^[14] in petunia.

Factor (B): Jeevamrit Application

The significantly highest flower diameter (cm) was observed in treatment J₃ (Spray application 10% jeevamrit at monthly) of (6.35 cm), which was significantly followed by the treatment J₂ (Spray application 5% jeevamrit at fortnightly) that produced a flower diameter (cm) of (6.02 cm). In contrast, the lowest flower diameter (cm) of (5.78 cm) was observed in the treatment J₁ (Water). The optimum nutrient levels in plants resulting from monthly spray of 10% jeevamrit in J₃ treatment aided the likely cause of the Jeevamrit flower growth in size can be linked to the microbes increased solubilization and uptake of nutrients. Along with the presence of NPK, Jeevamrit also had GA₃ and IAA, which may have contributed to the better vegetative growth and large flower size development compared to other application frequencies, by ensuring balanced micronutrient supply for enhanced cell division and expansion. The beneficial results of Jeevamrit are also opined by Mandavi *et al.* (2022)^[17] in china aster and Gulser *et al.* (2019)^[10] in petunia.

Interaction (M x J)

Interaction effect of jeevamrit spray on petunia was found significantly highest in treatment M₃J₃ for flower diameter (cm) of (6.89 cm), which was at par with the treatment M₄J₃ and M₄J₂ that produced a flower diameter (cm) of (6.76 cm and 6.65 cm). In contrast, the lowest flower diameter (cm) of (5.26 cm) was observed in the treatment M₁J₁. Flower size has increased with the use of jeevamrit along with soil, cocopeat, and FYM (1:1:1) as a growing medium. It is associated with the beneficial properties of cocopeat, such as enhancing soil texture and water-holding capacity, and the advantageous qualities of jeevamrit, such as enhancing flower diameter. Results that are similar to those obtained by Sharma *et al.* (2020)^[20] in petunia. Because there were more buds on each plant in treatment combination M₄J₃, the flower diameter may not have expanded any more.

Survival percentage (%)

Factor (A): (Growing Media Combination)

Among the data, significantly highest survival percentage (%) was observed in the treatment M₄ [soil + cocopeat + vermicompost (1:1:1)] resulted in of (94.60%), which was followed by the treatment M₃ [Soil + cocopeat + FYM (1:1:1)] and M₂ [Soil + rice husk + vermicompost (1:1:1)] that produced a survival percentage (%) of (92.63% and 87.77%). In contrast, the lowest survival percentage (%) of (81.52%) was observed in the treatment M₁ [Soil + rice husk + FYM (1:1:1)]. The soil-cocopeat-vermicompost media in M₄ highest survivability compared to other growing media tested. Because cocopeat release phenolic compounds from the coir pith and also can be attributed to the beneficial physical characteristics of cocopeat like aeration and water holding capacity which promote better survival percentage for planted petunia seedling, facilitating better root establishment and overall plant health. This resulted in these outcomes are consistent with findings of Hongpakdee and Ruamrungsri (2017)^[11] in petunia and Singh *et al.* (2020)^[23] in bougainvillea.

Factor (B): Jeevamrit Application

Among the data, significantly highest survival percentage (%) was observed in the treatment J₃ (Spray application 10% jeevamrit at monthly) of (91.85%), which was followed by the treatment J₂ (Spray application 5% jeevamrit at fortnightly) that produced a survival percentage (%) of (89.25%). In contrast, the lowest survival percentage (%) of (86.29%) was observed in the treatment J₁ (Water). The 10% jeevamrit solution applied monthly resulted in the highest petunia survival significantly. The 5% dose sprayed biweekly led to the second best survival rate. Water alone showed the lowest, indicating jeevamrit's growth and defense stimulating properties helped protect petunias, with the stronger 10% formulation conferring maximum benefits when applied less regularly. Similar result was also found by Choudhary *et al.* (2021)^[7] in marigold.

Interaction (M x J)

Interaction effect of jeevamrit spray on petunia was found significantly highest in treatment M₄J₃ for survival percentage (%) of (95.76%), which was at par with the treatment M₄J₂ and M₃J₃ that produced a survival percentage (%) of (95.16% and 94.63%). In contrast, the lowest survival percentage (%) of (78.92%) was observed in the treatment M₁J₁. The combination of the enriched organic growing medium Soil + Cocopeat + vermicompost with supplemental 10% monthly jeevamrit sprays resulted in significantly highest survival percentage in petunia. The properties of cocopeat make it resistant to bacterial and fungal growth. It also extends the life of compost. Cocopeat provides the plants easy porosity for growing roots and good aeration for the healthy plant growth. The balanced nutrition from the organic mix along with beneficial microbes and growth enhancers in jeevamrit likely reduced transplant shock and mortality. In contrast, the soil-only control with just water sprays had lowest survival indicating suboptimal growth conditions. An integrated organic and biofertilizer approach thus improves plant health and survival percentages. These results were obtained by Choudhary *et al.* (2021)^[7] in marigold and Sharma *et al.* (2020)^[20] in petunia

50% flowering (days)

Factor (A): (Growing Media Combination)

The significantly registered the minimum 50% flowering (days) in the treatment M₄ [Soil + cocopeat + vermicompost (1:1:1)] were recorded at (68.30), which was followed by the treatment M₃ [Soil + cocopeat + FYM (1:1:1)] and M₂ [Soil + rice husk + vermicompost (1:1:1)] of (71.37) and (74.66). In contrast, the significantly maximum 50% flowering (days) of (76.30) was observed in the treatment M₁ [soil + rice husk + FYM (1:1:1)]. The combination of soil, cocopeat and vermicompost in treatment M₄ provided the ideal nutrition and water retention for the earliest flowering. The presence of vermicompost helped enrich the soil with nutrients and microorganisms, facilitating faster plant growth and development leading to early flowering compared to other media combinations tested. Singh *et al.* (2018)^[22] in gerbera also discovered a comparable outcome.

Factor (B): Jeevamrit Application

The significantly registered the minimum 50% flowering (days) in the treatment J₃ (Spray application 10% jeevamrit at monthly) were recorded at (70.72), which was at par with the treatment J₂ (Spray application 5% jeevamrit at fortnightly) that produced a 50% flowering (days) of (71.95). In contrast, the significantly maximum 50% flowering (days) of (75.30) was observed in the treatment J₁ (Water). The 10% jeevamrit treatment applied monthly resulted in the earliest significant 50% flowering time

compared to other solutions. While 5% jeevamrit sprayed biweekly also enhanced early blooming. Water alone took a significantly longer period to reach half bloom, demonstrating jeevamrit's efficacy in hastening flowering likely through supply of nutrients promoting rapid petunia growth. Similar results collaborate with the finding of Sharma *et al.* (2020) [20] in petunia.

Interaction (M x J)

Interaction effect of jeevamrit spray on petunia was found significantly minimum in treatment M₄J₃ for 50% flowering (days) of (66.12), which was followed by the treatment M₄J₂ and

M₃J₃ that produced a 50% flowering (days) of (66.90 and 69.02). In contrast, the maximum 50% flowering (days) of (78.11) was observed in the treatment M₁J₁. The combination of soil, cocopeat and vermicompost in treatment M₄J₃ created optimal conditions for root establishment and growth of petunia seedlings. This, along with the 10% jeevamrit solution applied monthly, significantly enhanced the overall health and nutrition of plants, facilitating their earliest flowering compared to other media and treatments. The vermicompost enriched the soil while jeevamrit hastened petunia development by supplying nutrients that promoted quicker flowering. The similar results was also found by Dubey *et al.* (2013) [8] in petunia.

Table 4.1: Effect of growing media and jeevamrit spray on flowering parameter in petunia (*Petunia hybrida*)

Treatment details	Days taken of bud emergence	No. of bud per plants	No. of days taken for 1 st flower opening	Duration of flower (days)	Flower diameter (cm)	Survival percentage (%)	50% flowering (days)
Factor (A): Growing Media Combination							
M1: Soil + rice husk + FYM (1:1:1)	54.78	14.23	63.98	28.32	5.96	81.52	76.30
M2: Soil + rice husk + vermicompost (1:1:1)	51.99	15.42	61.96	30.50	5.81	87.77	74.66
M3: Soil + cocopeat + FYM (1:1:1)	49.06	16.91	59.61	33.65	6.61	92.63	71.37
M4: Soil + cocopeat + vermicompost (1:1:1)	47.96	17.96	58.16	36.23	6.33	94.60	68.30
SE(M) ±	0.13	0.03	0.12	0.33	0.04	0.05	0.14
C.D. at 5%	0.38	0.08	0.34	0.97	0.12	0.13	0.41
Factor (B): Jeevamrit Application							
J1: Water	53.17	14.87	62.80	29.68	5.78	86.29	75.30
J2: Spray application 5% jeevamrit at fortnightly	50.40	16.56	60.34	32.87	6.02	89.25	71.95
J3: Spray application 10% jeevamrit at monthly	49.08	16.96	59.65	33.98	6.35	91.85	70.72
SE(m)±	0.11	0.02	0.10	0.29	0.03	0.04	0.12
C.D. at 5%	0.33	0.07	0.29	0.84	0.10	0.11	0.35
Interaction (M x J)							
M ₁ J ₁	56.70	13.61	65.71	26.91	5.26	78.92	78.11
M ₁ J ₂	55.51	14.33	63.47	28.63	5.40	80.46	76.10
M ₁ J ₃	52.13	14.74	62.76	29.43	5.71	85.19	74.69
M ₂ J ₁	56.12	13.86	63.93	27.53	5.56	83.67	77.16
M ₂ J ₂	50.02	15.94	61.18	31.18	5.82	87.82	73.75
M ₂ J ₃	49.83	16.47	60.78	32.79	6.04	91.81	73.06
M ₃ J ₁	50.81	15.42	61.89	30.34	5.88	89.69	74.04
M ₃ J ₂	48.97	17.52	58.91	34.78	6.20	93.56	71.05
M ₃ J ₃	47.41	17.80	58.02	35.83	6.89	94.63	69.02
M ₄ J ₁	49.06	16.60	59.67	33.93	6.41	92.88	71.89
M ₄ J ₂	47.09	18.46	57.79	36.90	6.65	95.16	66.90
M ₄ J ₃	46.96	18.81	57.03	37.87	6.76	95.76	66.12
SE(m)±	0.22	0.05	0.20	0.57	0.07	0.08	0.24
C.D. at 5%	0.66	0.14	NS	NS	0.20	0.23	0.71
CV (%)	1.00	0.70	0.75	4.30	2.73	0.21	0.76

Conclusion

The experiment concluded that the combination of growing media M₄ (Soil + cocopeat + vermicompost) with jeevamrit application J₃ (10% spray monthly) performed the best by recording highest values for bud emergence, number of buds, flower duration, survival percentage and lowest days for 50% flowering. This treatment also recorded maximum flower diameter along with growing media M₃ (Soil + cocopeat + FYM). Thus, the use of cocopeat-based media with vermicompost and FYM along with monthly spray of 10% jeevamrit can be recommended for achieving higher growth and flower productivity of petunia under open field conditions.

References

1. Anonymous. Directorate Horticulture and Farm Forestry, Chhattisgarh (Department of Agriculture, Government of Chhattisgarh); c2021.
2. Anonymous. National Horticulture Database published by National Horticulture Board. Ministry of Agriculture and Farmers Welfare, 3rd Advance estimates, 2021-22; 2022.
3. Arunesh A, Muraleedharan A, Sha K, Kumar S, Joshi JL, Kumar PS, Rajan EB. Studies on the effect of different growing media on the growth and flowering of Gerbera cv. Goliath. Plant Arch. 2020;20(1):653-657.
4. Bailey LH. Manual of Cultivated Plants. Macmillan; c1951. p. 1116.

5. Bala M, Singh K. Effect of different potting media for pot mum production in chrysanthemum grown under open and polyhouse conditions. *J Ornamental Hortic.* 2013;16(1):35-39.
6. Cantor M, Krizbai E, Buta E. The behaviour of some petunia varieties for improvement of the Romanian Assortment. Technical Bulletin 72. University of Agricultural Sciences and Veterinary Medicine, Rome; c2015. p. 6.
7. Choudhary S, Kashyap B, Choudhary RC, Jat ML. Effect of Jeevamrit on growth and flowering of marigold. *The Pharma Innovation J.* 2021;10(8):1037-1040.
8. Dubey RK, Singh S, Kukal SS, Kalsi HS. Evaluation of different organic growing media for growth and flowering of petunia. *Commun Soil Sci Plant Anal.* 2013;4(2):1777-1785.
9. Gore NS, Sreenivasa MN. Influence of liquid organic manures on growth, nutrient content, and yield of tomato (*Lycopersicon esculentum* Mill.) in sterilized soil. *Karnataka J Agric Sci.* 2011;24(2):153-157.
10. Gulser F, Cig A, Atmaca H. Effect of different growing media on plant growth and nutrient contents of petunia. *Int J Secondary Metabolite.* 2019;6(4):302-309.
11. Hongpakdee P, Ruamrungsri S. Coconut coir dust ratio affecting growth and flowering of potted petunia hybrids. *Acta Hortic.* 2017;1167:369-374.
12. Jehoshaphat V, Saravanan S, Shabi M, Deepanshu, Kumar M. Effect of different growing media on growth, flowering, and corm yield of gladiolus cultivars (*Gladiolus grandiflorus* L.). *The Pharma Innovation J.* 2017;6(11):618-620.
13. Karre S, Dilta BS, Verma R, Bhatia S. Effect of different levels of GA3 on plant growth, flowering, seed yield, and quality attributes in petunia. M.Sc. Thesis. Department of Floriculture and Landscape Architecture, Dr. Yashwant Singh Parmar University of Horticulture and Forestry, Solan; c2022. p. 1-65.
14. Khandaker MM, Rahmat S, Alias N, Mohd KS, Mat N. The effects of different growing media on growth, flowering, and quality of petunia grandiflora. *Tarım Bilimleri Dergisi – J Agric Sci.* 2018;25(3):373-383.
15. Knapp S. Floral diversity and evolution in the Solanaceae. In: *Developmental Genetics and Plant Evolution*. London: Taylor and Francis; c2002. p. 267-297.
16. Madurangani HGAMP, Gunasekera HKLK, Wickramasinghe MC. Investigation of best potting media to enhance flowering performance of Petunia hybrida. *J Agron Agric Sci.* 2020;3(2):026.
17. Mandavi G, Netam N, Sahu TL, Sushila, Nishad D, Kumar D. Effect of different growing media and gibberellic acid on flowering parameters of China aster (*Callistephus chinensis* (L.) Nees) cv. Arka Poornima for pot plant production. *The Pharma Innovation J.* 2023;12(7):827-831.
18. Moghadam MZ, Shoor M. Effects of vermicompost and two bacterial biofertilizers on some quality parameters of petunia. *Notulae Scientia Biologicae.* 2013;5(2):226-231.
19. Sahu P. Effect of different growing media on growth and flowering of petunia (*Petunia hybrida* L.). M.Sc. Thesis. Department of Floriculture and Landscape Architecture, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya Gwalior, (M.P.); c2021. p. 1-86.
20. Sharma R. Effect of growing media and Jeevamrit on potted petunia (*Petunia hybrida* Vilm.). M.Sc. Thesis. Department of Floriculture and Landscape Architecture, Dr YS Parmar University of Horticulture and Forestry, Nauni, Solan; c2020. p. 65.
21. Singh M, Dwivedi DH, Kumar M. Efficiency of organic and biodynamic manures on growth and flowering in marigold (*Tagetes patula* L.). *Prog Agric.* 2015;15(1):134-137.
22. Singh S. Effect of Jeevamrit and different growing media on growth and flowering of gerbera (*Gerbera Jamesonii* Bolus ex. Hook). M.Sc. Thesis. Department of Floriculture and Landscape Architecture, Dr YS Parmar University of Horticulture and Forestry, Nauni, Solan; c2018. p. 45.
23. Singh B, Sindhu SS, Yadav H, Saxena NK. Effect of different potting media on bougainvillea cv. Mahara. *Chem Sci Rev Lett.* 2020;9(33):158-161.
24. Sreenivasa MN, Naik NM, Bhat SN. Beneficial traits of microbial isolates of organic liquid manures. In: *First Asian PGPR Congress for Sustainable Agriculture*, 21-24 June, ANGRAU, Hyderabad; c2009. p. 133.
25. Sreenivasa MN, Naik NM, Bhat SN. Nutrient status and microbial load of different organic liquid manures. *Karnataka J Agric Sci.* 2011;24(2):583-584.
26. Talang D, Fatmi U, Sandeep K, Raquib A. Evaluation of different hybrids of petunia (*Petunia hybrida*) under Allahabad agro-climatic conditions. *J Pharmacognosy Phytochem.* 2019;8(3):66-68.
27. Venkatesh IM, Prasad VM, Saravanan SS. Effect of micronutrients on growth, flower yield, and flower quality of petunia (*Petunia hybrida*) cv. Purple Star. *J Pharmacognosy Phytochem.* 2021;10(1):1544-1547.