

EFFECTS OF VERMICOMPOST AND PINCHING ON MARIGOLD FLOWER AND SEED

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ABSTRACT

*Marigold, positioning one of the major free flowers is broadly grown everywhere throughout the India; representing the greater part of countries free bloom production. In the year 2011-12, the evaluated zone under free bloom in India was 2.54 lakhs ha and production 16.52 lakhs metric tons. In Chhattisgarh, Marigold is grown in a region of 3132 ha with a production of 19934 MT. The survey of published literature revealed that very limited published information is available in seed production of flowering annuals particularly on seed yield contributing characters and seed quality attributes of marigold. However, whatever literature is available on planting time; Spacing and pinching on seed yield and quality in African marigold (*Tagetes erecta* L.) are presented in this paper. Besides the marigold the relevant literature from the other crops are also included.*

1. INTRODUCTION

Marigold is a leading loose flower crop of India which can be grown all over the world. It occupies special importance due to its hardiness, easy cultivation and wider adaptability to wide range of agro-climatic conditions. In India, the total area under marigold cultivation is 42.88 thousand hectares with production of 501.87 thousand tonnes (Anon., 2015) [1]. It is a very popular annual flower crop widely grown as garden plant, pots plant, bedding plant and herbaceous border for beautification and commercially used for making garlands, wreaths, religious offering, cut flowers and other purposes such as oil extraction and pigment extraction mainly xanthophyll. In most of the flower crops, the flowering and yield is mainly dependent on number of flower bearing branches which can be manipulated by checking vertical growth of plants and encouraging side shoot by means of pinching apical bud (Sasikumar et al., 2015) [2]. The main purpose of pinching is to encourage branching to produce a bushy growth and or the production of more flowers and flower yield. Nitrogen is well known for its influence on growth, flower production and quality of Marigold flower.

2. EFFECTS ON FACTORS ON MARIGOLD FLOWER

Effects of Vermicompost and Two Bacterial Bio Fertilizers on Some Quality

Increase blossom production, nature of blooms and flawlessness as plants are the critical targets to be perceived in bedding and blossom production. Boodley (1975) [3] viewed quality as an element of supplement level. Despite the fact that nitrogen, phosphorus, and potassium impact the production and nature of blooms significantly, the composts suggestion is high which ponders specifically cost of production. What's more, utilization of engineered manures and chemicals in

high ranges have natural contamination issue with potential perils to vegetation and furthermore on people. The basic garden petunia, *Petunia hybrida*, is gotten from *P. integrifolia* and *P. axillaris*, two of numerous *Petunia* species endemic to South America. *Petunia* contains yearly or lasting herbs, up to 1 m tall, with erect, ascendant, decumbent, or procumbent stems, once in a while establishing at the hubs.

In this way, accentuation is presently centred on the utilization of natural fertilizers, for example, compost, vermicompost, cultivate yard excrements and bio fertilizers like *Azotobacter*, *Azospirillum* and phosphate solubilizing microorganisms (PSB). Worms use natural squanders as sustenance and the undigested material discharged by them has picked up the name 'vermicompost' [4]. The vermicompost fills in as natural compost, since it is a wellspring of supplements, for example, nitrogen, phosphate, potassium, humic acids, and micronutrients. Bio-manures or all the more properly called 'microbial inoculants' are the arrangements containing live or dormant cells of effective strains of miniaturized scale living beings. These might be organic nitrogen fixers, P-solubilizing, mineralization of nitrogen and change of a few components like sulphur and iron into accessible structures [5].

Effect of Growth Parameters

Treatments	Plant height (cm)		Plant spread in N-S (cm ²)		Plant spread in E-W (cm ²)		No. of branches per plant		Fresh weight of plant (g)	Dry weight of plant (g)
	90 DAT	At harvest	90 DAT	At harvest	90 DAT	At harvest	90 DAT	At harvest		
Time of sprays (S)										
S ₁ - 30 DAT	46.85	56.91	49.56	57.47	50.74	59.19	26.45	32.84	300.99	32.54
S ₂ - 60 DAT	49.41	59.76	47.16	54.31	48.40	56.07	25.06	30.51	278.66	30.65
S.E.m.±	0.77	0.83	0.71	0.89	0.70	0.92	0.41	0.64	4.48	0.57
C.D. at 5%	2.25	2.43	2.06	2.58	2.04	2.69	1.19	1.87	13.02	1.65
Plant Growth Retardants (P)										
P ₁ - MH-500 mg l ⁻¹	46.00	56.00	50.32	58.15	52.19	60.00	27.26	33.61	299.11	33.15
P ₂ - MH-700 mg l ⁻¹	44.48	54.72	52.15	60.78	53.25	62.45	28.80	34.89	317.55	35.87
P ₃ - CCC-2000 mg l ⁻¹	46.75	56.75	47.24	54.80	48.24	56.46	25.59	30.60	289.28	31.72
P ₄ - CCC-2500 mg l ⁻¹	47.06	57.06	49.98	57.81	50.98	59.81	26.31	32.78	298.36	33.00
P ₅ - PCB-0.4 ml l ⁻¹	49.48	59.98	45.05	52.30	46.55	53.97	23.14	28.77	267.81	27.38
P ₆ - PCB-0.5 ml l ⁻¹	50.50	60.50	46.78	53.08	47.78	54.75	25.04	31.33	284.85	30.33
P ₇ - Control (Water spray)	52.65	63.34	47.00	54.31	48.00	55.98	24.16	29.75	271.82	29.72
S.E.m.±	1.64	1.77	1.50	1.88	1.49	1.96	0.87	1.36	9.50	1.20
C.D. at 5%	4.78	5.15	4.37	5.46	4.33	5.70	2.53	3.96	27.63	3.50
Interaction (S×P)										
S.E.m.±	2.32	2.50	2.13	2.66	2.11	2.77	1.23	1.93	13.44	1.70
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
C.V.%	8.36	7.43	7.62	8.24	7.36	8.33	8.27	10.53	8.03	9.32

Table 1: Effect of growth retardants on growth parameters of chrysanthemum cv. IHR-6

The outcomes from Table1 uncovered that development parameter viz., the number of branches and a plant spread of the plant were greatest in chrysanthemum cv. "IHR-6" when showered at 30 days in the wake of transplanting (S1) while, plant height was greatest when splashed at 60 days in the wake of transplanting (S2) [6]. The increment in a number of branches in S1 treatments may be because of incitement of expanding and production of a number of hubs potentially credited to the breakage of apical predominance and in this way settings up of adjusting and in addition improved separation of internodes. Among all treatments, MH 700 mg l⁻¹ watched most extreme reduction of plant height. The reduction in plant height because of bringing down of the auxin substance and acts inimically to auxin in this way totally stifles the apical strength by restraining the phone

division on the apical meristem and consequently bringing about the lessening of the plant height. Cycocel (CCC) caused a noteworthy decrease in plant height as it is observed from the Table 1 [7].

Effect on Flowering Yield Parameters

All the treatment of development retardants varied fundamentally regarding days to first bloom bud appearance and first blossoming, days to 50 for each penny flowering were altogether least when plant was showered at 30 DAT (S1) which collected of vegetative bud into the regenerative bud. The medicines of MH and CCC altogether deferred bud arrangement when contrasted with control [8]. Most extreme deferral in bud arrangement was seen with MH 700 mg l⁻¹ treatment. The postponement in bloom bud arrangement might be because of decrease in the blossom bud advancement and hindrance of GA biosynthesis by the connected chemicals. Comparative finding were additionally acquired chrysanthemum. In the present examination, reaction of different medicines to days required for opening of first blossom in the wake of transplanting contrasted fundamentally [9].

Treatments	Days required to first flower bud	Days required for opening of first flower	Days to 50 per cent flowering	Flowering span (days)	Fresh weight of flower per plant (g)	Number of flowers per plant	Number of flowers per plot	Yield of flowers per plot (kg)	Yield of flowers (t ha ⁻¹)
Time of sprays (S)									
S ₁ - 30 DAT	69.01	75.48	106.24	43.26	102.73	30.89	741.34	2.52	10.88
S ₂ - 60 DAT	72.60	80.23	111.44	38.53	95.34	28.78	690.64	2.39	9.59
S.Em.±	1.03	1.40	1.32	0.73	2.06	0.62	14.80	0.04	0.18
C.D. at 5%	3.00	4.06	3.85	2.12	6.00	1.79	43.04	0.11	0.52
Plant Growth Retardants (P)									
P ₁ - MH-500 mg l ⁻¹	67.07	73.62	102.58	41.39	110.59	31.87	764.80	2.59	11.71
P ₂ - MH-700 mg l ⁻¹	64.51	70.94	101.16	46.36	120.46	33.62	806.80	2.64	13.43
P ₃ - CCC-2000 mg l ⁻¹	69.65	74.24	106.57	40.07	98.87	29.50	707.88	2.40	10.06
P ₄ - CCC-2500 mg l ⁻¹	71.70	79.88	113.50	43.15	103.39	30.04	720.84	2.56	10.91
P ₅ - PCB-0.4 ml l ⁻¹	76.75	83.70	118.72	37.89	93.43	27.12	650.84	2.28	6.83
P ₆ - PCB-0.5 ml l ⁻¹	72.40	80.76	109.65	39.25	80.17	28.79	690.96	2.39	9.78
P ₇ - Control (Water spray)	73.54	81.84	109.69	38.19	86.33	27.91	669.80	2.36	8.93
S.Em.±	2.19	2.96	2.81	1.55	4.38	1.31	31.40	0.08	0.38
C.D. at 5%	6.37	8.62	8.16	4.50	12.72	3.80	91.31	0.22	1.11
Interaction (S×P)									
S.Em.±	3.10	4.19	3.97	2.19	6.19	1.85	44.41	0.11	0.54
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS
C.V.%	7.58	9.32	6.32	9.27	10.82	10.74	10.74	7.66	9.15

Table 1.2: Effect of Growth Retardants on Flowering and Flower Yield of Chrysanthemum Cv. IIHR-6

This outcome is in congruity with the discoveries In yield parameters the outcomes showed that a number of blossom per plant and bloom yield was recorded most extreme under plant splashing at 30 DAT (S1). The number of branches and most extreme plant spread in this treatment had collected more starches through photosynthesis and were specifically utilized for expanding the number of blooms and blossom yield. In the present examination, the most extreme number of blooms per plant and blossom yield was seen with MH 700 mg l⁻¹[10].

This increase in a number of blooms per plant may be because of increased number of branches which eventually upgraded the blossom production. The increment in blossom yield may be because of decreased plant height by smothering the apical strength, increase the primary and

optional fanning, accordingly expanding the bloom number which at last brought about increase yields of flowers. The interaction impact between the time of shower and plant development retardants was discovered non-critical as for flowering and yield parameters viz., days required for opening of the first blossom, days to 50 for each penny blossoming, blossoming range, the weigh weight of bloom and yield parameters. Financial matters showed that the plant showered at 30 days subsequent to transplanting (S1) and splashed with MH 700 mg l⁻¹ (P2) were discovered most gainful as they gave most astounding net comes back with greatest Benefit Cost Ratio (BCR) [11].

Effect Pinching and Growth Regulators on Seed Yield and Quality of Marigold

Non – pinched plants (P1) recorded out and out more plant height at 60 DAT and gather (85.26 and 95.93 cm, independently) appeared differently in relation to pinched plants (76.43 and 86.90 cm, independently). While pinched plants (P2) recorded out and out different branches (10.83 and 12.00) per plant at 60 DAT and at assembling, independently diverged from non-pinched plants (9.53 and 11.00 separately). The decreasing in plant height in pinched plants is crucial as a result of the transfer of apical prevalence and redirection of the plant metabolites from vertical improvement to even advancement and recording more branches per plant. As the apical quality is cleared by and large the plant itself changes with supporting the advancement of aide buds which may be changed over into branches [12].

Pinching achieved increment number of branches per plant which might be credited to the breaking of apical quality and growing of assistant buds. So additionally revelations were represented by Singh and Arora (1980) in African marigold, in Carnation Pinched plants took logically (56.12) number of days to 50 for each penny blossoming stood out from non-pinched plants (51.70 days). The put off blossoming as a result of pinching was also found in China aster, Grawal et al. (2004) in chrysanthemum in marigold, which might be a result of the departure of an apical piece of the plants [13]. The as of late emerged shoot put aside longer chance to wind up recognizably physiologically create, which in this manner bear flowers and henceforth achieved delayed the days to 50 for each penny flowering. The most extraordinary number of sprouts per plant (61.88) was recorded in pinched plants stood out from un-pinched plants (50.77).

The increase number of flowers would be credited to break the apical power by pinching of apical part conveyed different branches per plant. In any case, 1000 seed weight was most prominent at pinching treatment (P2) stood out from un-pinching treatment (P1). Hectare (473.71 kg) diverged from un-pinching treatment (15.58 g/plant and 398.65 kg/ha). The increase seed yield in view of apical pinching of plants can be attributed to the proportionate augmentation in yield contributing characters i.e., more number of profitable branches and more number of sprouts per plant marigold. Pinching treatment did not have any important effect on seed quality parameters. In any case, higher regards for these quality parameters (viz., germination rate, root length, shoot length, seedling dry weight, and life document and field rise) were recorded in pinching treatment. This higher regard at pinching treatment might be credited to higher 1000 seed weight at pinching treatment.

Influence of Growth Regulators

GA3 200 ppm shower basically increment the plant height at 60 DAT and gather (88.59 and 101.21 cm, exclusively) trailed by NAA 60 ppm (84.32 and 95.72 cm, independently). While ethrel 1000 ppm inside and out diminished the plant height at 60 DAT and procure (72.44 and 82.57 cm, independently) [14]. Basically, different branches per plant (12.90 and 14.47) was recorded as a result of GA3 200 ppm shower appeared differently in relation to ethrel 750 ppm sprinkle (7.59 and 8.99) at 60 DAT and gather, independently. The development in plant height and number of branches per plant with the use of GA3 is in every way in light of enhanced cell division and cell widening, the progression of protein amalgamation joined with higher dry issue assembling in the plant.

The extension in yield and yield parameters with GA3 sprinkling was a direct result of better reap advancement, different branches as needs be incremented the number of flowers per plant and in the long run increment the seed yield. This can be attributed to translocation of the source to absorb China weight (3.34 g), germination (90.13%), root length (6.34 cm), shoot length (5.41 cm), seedling dry weight (11.44 mg), life record (1059) and field rise (77.10%) [15]. This is regularly a result of GA3 application which brought metabolic change that impacted both quality and measure of the pined for the thing. It similarly enables blend of hydrolytic mixes which are transmitted and followed up on dull endosperm along these lines affecting the physiology of seed germination and the establishment of seedlings, control record, and field rise.

African marigold a fundamental commercial yearly blossom having a place with family Asteraceae, is a neighbourhood of Central and South America especially Mexico. In India, it was exhibited by Portuguese. At the point when stood out from other blossoming annuals, Marigold is successfully flexible to different conditions of growing and has truly incredible keeping quality. It is multiplied by seeds and comes up well in an extensive variety of soil. It is a solid yearly plant and accomplishes more than 150 cm height inside its future of four and half months. The sprouts of this species are generally tremendous in measure with awe inspiring colour, stretching out from yellow to orange and are the best for the blend in any bloom strategy. Marigold is created as a favour reap for its flowers, which are sold in the market as free sprouts in mass, as a distinguishing strength cut flowers, or for making shrubs or for an outline in the midst of a couple of religious limits, other than its usage in scene growing [16].

The leaves are used as a piece of kidney burdens and in solid torment. A blend of the plant is used against solidness, cool and bronchitis. Inside, they are said to channel blood and blossom juice is given as an answer for depleting stores. Leaf stick is used remotely against air pockets and carbuncles. Chhattisgarh state is basically a rice-growing area and the typical farmers are poor and untalented, as tribals constitute a critical bit of the masses and they can distinctive commercial in cultivation. The neighbourhood usage of free flowers, especially of marigold, China aster, jasmine; crossandra is growing well ordered. There is overpowering enthusiasm for the flowers in the midst of the festival time like Dushehra, Diwali and in the midst of the marriage seasons. Most by far of the necessities are met by the cultivators/suppliers of Calcutta and Nagpur [17]. There is a massive gap between the free market movement which the adjacent cultivators may utilize additionally reinforcing their favourable luck. Marigold is one of the decision flowers in the

flowering commercial sector of Chhattisgarh. It is regarded with different typical central focuses like bounteous sunlight, the immense temperature for its advancement.

African marigold is one of the basic bloom trim grew monetarily in a different bit of India. It is sans driving sprout of India. Other than an immaculate sheet material plant, African marigolds are fiscally used as free sprout for development and organizing purposes. Sterilized separate is found beneficial to control nematode masses. Work on pinching has been done on Marigold and it responded well for blossom production however obliged information is available on the effect of twofold pinching in marigold. Showering of nitrogen on the carnation plant has been found beneficial.

➤ Flowering Parameters

Each one of the treatments fail to apply the tremendous effect on the broadness of blossom, while days took to blossoming, the number of blooms/plant, blossom weight/plant, and sprout yield/m were influenced in light of different drugs. Single pinching + 1% nitrogen application indicated early flowering taken after by single pinching and twofold pinching+ 3% nitrogen application [18]. Following twofold pinching and usage of 2% nitrogen animated advancement and made a number of assistant branches thusly, more flowers and increment yield. The significant effect of pinching and utilization of nitrogen on sprout production was ex-per objectively substantiated by before pros.

➤ Seed Yield and Yield Attributes

Moreover, twofold pinching + 2% nitrogen application selected most extraordinary weight of seeds/plant and seed yield/m taken after by twofold pinching. In the present examination, twofold pinching + 2% nitrogen application in like manner found all the more intense to extend the seed production of marigold. Twofold pinching lessened the apical quality of the plant so more laterals made and the number of branches increment [19].

3. CONCLUSION

The after effects of present investigation with the help of existing literature uncovered that separating impacted the yield characters viz. normal weigh and dry weight of bloom and blossom yield per plant were more in more extensive dispersing (40 x40cm). Notwithstanding, yield per ha was greatest in nearer dispersing (30 x30cm) when contrasted with more extensive separating as a result of high plant populace. The increase in yield per plant under more extensive dispersing may be because of credit to less rivalry for nourishment and water among the plants. 53 Yield for every hectare increase in the pinching treatments following 28 days subsequent to transplanting when contrasted with no pinching. This noteworthy increment following 28 days of pinching might be because of the increase number of branches these outcomes are in close similarity with the discoveries in marigold.

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