



ISSN (E): 2277-7695

ISSN (P): 2349-8242

TPI 2024; 13(6): 01-03

© 2024 TPI

www.thepharmajournal.com

Received: 01-03-2024

Accepted: 04-04-2024

Anjana Jangde

M.Sc. (Hort.), Department of Fruit Science, Pt. K.L.S. College of Horticulture and Research Station, Rajnandgaon, IGKV, Raipur Chhattisgarh, India

UB Deshmukh

Assistant Professor, Department of Fruit Science, Pt. K.L.S. College of Horticulture and Research Station, Rajnandgaon, IGKV, Raipur Chhattisgarh, India

MS Paikra

Associate Professor, Department of Fruit Science, Pt. K.L.S. College of Horticulture and Research Station, Rajnandgaon, IGKV, Raipur Chhattisgarh, India

MK Chandrakar

Assistant Professor, Department of Entomology, Pt. K.L.S. College of Horticulture and Research Station, Rajnandgaon, IGKV, Raipur Chhattisgarh, India

Corresponding Author:

Anjana Jangde

M.Sc. (Hort.), Department of Fruit Science, Pt. K.L.S. College of Horticulture and Research Station, Rajnandgaon, IGKV, Raipur Chhattisgarh, India

Effect of gibberellic acid and different growing media on seed germination of acid lime

Anjana Jangde, UB Deshmukh, MS Paikra and MK Chandrakar

DOI: <https://doi.org/10.22271/tpi.2024.v13.i6a.25695>

Abstract

The present research entitled “Effect of Gibberellic acid and different growing media on seed germination of Acid lime” was conducted during *Rabi* season of 2019 at Horticulture Farm of Pt. K.L.S. College of Horticulture and Research Station, Rajnandgaon (C.G.). The experiment was laid out in CRD with factorial concept and there were 2 factors, first was growing media and second was GA₃. There were 5 levels of factor A (Growing media), M₁ Soil + FYM (1:1), M₂ Soil + Vermicompost (1:1), M₃ Soil + FYM + Cocopeat (1:1:1), M₄ Soil + Vermicompost + Cocopeat (1:1:1), M₅ Soil + FYM + Vermicompost + Cocopeat (1:1:1:1) respectively and 4 levels factor B (Gibberellic acid), G₀ (Control, 0 ppm), G₁ (100 ppm), G₂ (150 ppm) and G₃ (200 ppm). The data clearly showed that M₃ media was found to be the best for germination percentage (79.21%) and media M₅ was found to be the best for Days taken for initiation of germination (20.25). In case of gibberellic acid, G₃ took less time for initiation of germination (21.66) and found best for germination percentage (81.41%).

Keywords: Growing media, gibberellic acid, cocopeat, vermicompost, FYM, soil

1. Introduction

Citrus fruits are one of the largest and most important fruits of tropical and subtropical regions. Acid lime (*Citrus aurantifolia* Swingle) is an important subtropical fruit crop. Citrus fruits belong to the Rutaceae family and are native to India and south-eastern China. It is also known as Kagzi lime or Maxican lime or Pati lime (Prajapati *et al.* 2017) [5]. It occupies 3rd rank after mango and banana in India. Small, fruited Kagzi limes are classified botanically under *Citrus aurantifolia* (cv. swingle). The trees evergreen, medium sized, semi-vigorous and hardy, upright growth with an irregular and loose crown, foliage not dense, light green in colour, numerous thorns, fruit oblong and round, fruit colour greenish yellow and fruit juice is acidic in nature and fruit seeds are highly polyembryonic in nature. It is favorably grown in states of Andhra Pradesh, Tamil Nadu, Maharashtra and Madhya Pradesh. Acid lime produces flowers and fruits almost all round the year. Propagation of Kagzi lime is generally done by grafting, budding, air-layering and by seed. The commercial practice of propagation is by seed (Khatana *et al.* 2015) [2]. Citrus seeds are recalcitrant in nature hence impose serious storage problems due to their desiccation and chilling sensitivity. The seed treatment of citrus species with Gibberellic acid enhanced the germination of seeds, growth and uniformity of seedlings both in commercial and rootstock varieties. The use of growth regulators in overcoming the inhibitory action of certain chemical substances that delay the germination in Acid lime (Dilip *et al.* 2017) [1]. Growing media plays significant role in seed germination, growth and survival of seedling. Growing media having optimum water holding capacity, good aeration, electrical conductivity and organic matter possibly help in better growth of seedling and survival of seedling. Soil with pH slightly below the neutral point is best suited for seedling growth of acid lime. Various media like soil, FYM, Vermicompost and cocopeat are used as a growing media. Growing media composition influences seed germination and seedling growth. It is a substratum that provides the necessary elements and physical support to the germinating seedlings. Media must also have good water holding capacity, drainage, physical and chemical properties for growth of seedlings (Prajapati *et al.* 2017) [5].

2. Materials and Methods

The present investigation entitled “Effect of Gibberellic acid and different growing media on

seed germination of Acid lime” was carried out in the year 2019-2020 at Horticulture farm under Pt. K.L.S. College of Horticulture and Research Station, Rajnandgaon, (C.G.). The experiment was laid out in the Completely Randomized Design with factorial concept and replicated three times. There were 2 factors under this experiment, first factor was Growing media and the second one was Gibberellic acid (GA₃) The fruit seeds were pulped manually to extract the seeds. The extracted seeds were washed 2-3 times in clean water. The cleaned seeds were thoroughly dried and subjected to floating test by immersing in water. The heavy seeds which sink in water were selected for the experiment. Black polythene bags of size 5×8 inch with thickness of 200 gauge were used in this experiment and filled with the different growing media. 10 mg, 15 mg, and 20 mg of GA₃ was weighed in an electrical weighing balance and each was dissolved in 20 ml of Acetone solution to which distilled water was added to make up the volume equal to 100 ml as a stock solution. GA₃ treated seed of Acid lime were sown after 12 hours in Polythene bags of 5×8 inch size filled in different growing media mixture and its combinations. Per polythene bag, one seed was sown at 1.2 cm depth. There were 20 treatments and 3 replications under this experiment. Treatment contained 75 polythene bags.

3. Results and Discussion

3.1 Days taken for initiation of germination

Data showed up that minimum days of 20.25 were taken for initiation of seed germination was recorded when seed sown

in mixture of growing media consisting M₅ Soil+ FYM + Vermicompost + Cocopeat (1:1:1:1) and this growing media showed significant superiority over other treatments. Maximum days of 29.33 were taken for initiation of seed germination was recorded under M₁ Soil + FYM (1:1). The increasing seed germination parameters may be due to the beneficial effect of growing media combination in improving biological, physical and chemical properties of the media. Soil provides natural support to plant, cocopeat given warm condition, high water holding capacity and FYM as a source of organic manure provided better nutrition to the germinating seedlings. This finding is similar to that of Patel *et al.* (2017)^[4] and Parasana *et al.* (2013)^[3].

Gibberellic acid showed a significant effect on the days required for seed germination to begin. Minimum days of 21.66 were taken for the start of seed germination when the seed was treated with 200 ppm of GA₃ (G₃), which was significantly superior to other treatments. The participation of GA₃ in the activation of cytological enzymes together with the increased plasticity of the cell wall and the better water uptake may be the reason for the increased germination. The related findings were also supported by Tandon *et al.* (2019)^[6]. The maximum days of 28.20 were taken for the start of germination of the seed recorded under G₀ treatment (control / soaking in water). Data showed that minimum days of 17.00 were taken for initiation of seed germination under M₅G₃ treatment combination. Maximum days of 31.33 were taken for initiation of seed germination was recorded under M₁G₀ treatment combination.

Table 1: Influence of different growing media and gibberellic acid on days taken for initiation of germination

Treatments	Days taken for initiation of germination
Factor A: Growing media (M)	
M ₁ : Soil + FYM (1:1)	29.33
M ₂ : Soil + Vermicompost (1:1)	27.41
M ₃ : Soil + FYM + Cocopeat (1:1:1)	23.91
M ₄ : Soil + Vermicompost + Cocopeat (1:1:1)	25.66
M ₅ : Soil + FYM + Vermicompost + Cocopeat (1:1:1:1)	20.25
SE(m)	0.274
CD (p=0.05)	0.786
Factor B: Gibberellic acid (G)	
G ₀ : control/water soaked	28.20
G ₁ : 100 mg/lit	24.73
G ₂ : 150 mg/lit	26.66
G ₃ : 200 mg/lit	21.66
SE(m)	0.245
CD(p=0.05)	0.703

Table 2: Interaction effect of different growing media and gibberellic acid on days taken for initiation of germination

Treatments	G ₀	G ₁	G ₂	G ₃
M ₁	31.33	28.66	30.66	26.66
M ₂	30.00	26.66	27.66	25.33
M ₃	27.00	24.66	26.33	17.66
M ₄	28.00	25.33	27.66	21.66
M ₅	24.66	18.33	21.00	17.00
SE(m)	0.548			
CD(p=0.05)	1.571			
CV(%)	3.756			

3.2 Germination percentage (%)

Influence of growing media was found to be non-significant on germination percentage but maximum percentage (79.21%) was recorded under media M₃ (Soil + FYM +

Cocopeat) which was superior to rest of the medium, closely followed by M₅ (Soil + FYM + Vermicompost + Cocopeat) which recorded 76.66% germination, whereas, the minimum germination percentage (66.44%) was recorded under media M₁ comprising Soil + FYM (1:1). Highest percentage of germination in GA₃ 200 ppm might be due to fact that the synthesis of amino acids in plants is accelerated, which is indirectly exhibited by enhanced growth of acid lime. Similar research work has been also reported by Pawar *et al.* (2010)^[8]. Interaction effect between growing media and GA₃ was found to be non significant on seed germination. Data showed that maximum germination percentage (87.55%) was found under M₃G₃ treatment combination. Whereas minimum germination percentage (56.88%) was found under M₁G₀ consisting growing media Soil + FYM and seeds treated with 0 ppm GA₃ (control).

Table 3: Influence of different growing media and gibberellic acid on Germination percentage (%)

Treatments	Germination percentage (%)
Factor A. Growing media (M)	
M ₁ : Soil + FYM (1:1)	66.44
M ₂ : Soil + Vermicompost (1:1)	70.88
M ₃ : Soil + FYM + Cocopeat (1:1:1)	79.21
M ₄ : Soil + Vermicompost + Cocopeat (1:1:1)	74.22
M ₅ : Soil + FYM + Vermicompost + Cocopeat (1:1:1:1)	76.66
SE(m)	3.531
CD(p=0.05)	NS
Factor B. Gibberellic acid (G)	
G ₀ : control/water soaked	67.10
G ₁ : 100 mg/lit	74.48
G ₂ : 150 mg/lit	72.17
G ₃ : 200 mg/lit	80.17
SE(m)	3.158
CD(p=0.05)	9.06

Table 4: Interaction effect of different growing media and gibberellic acid on germination percentage (%)

Treatments	G ₀	G ₁	G ₂	G ₃
M ₁	56.88	67.99	65.77	75.11
M ₂	66.66	68.44	70.22	78.22
M ₃	72.88	81.33	77.33	85.33
M ₄	69.33	75.55	72.88	79.11
M ₅	69.77	79.10	74.66	83.11
SE(m)	7.062			
CD(p=0.05)	NS			
CV(%)	16.877			

4. Conclusion

Experimental results revealed that M₃ media Soil + FYM + Cocopeat (1:1:1) was found to be the best for germination percentage (79.21%) and media M₅ Soil + FYM + Vermicompost + Cocopeat (1:1:1:1) was found to be the best for Days taken for initiation of germination (20.25 days). In case of gibberellic acid, G₃ took less time for initiation of germination (21.66) and performed better for germination percentage (81.41%).

5. References

- Dilip WS, Singh D, Moharana D, Rout S, Patra SS. Effect of Gibberellic acid different concentrations at different time intervals on seed germination and seedling growth of Rangpur lime. *Journal of Agroecology and Natural Resource Management*. 2017;4(2):157-165.
- Khatana KJ, Jadav RG, Nehete DS. Influence of GA₃ on germination and growth of acid lime cv. KAGZILIME seed (*Citrus aurantifolia* Swingle) under field as well as net house conditions. *Asian J Hort*. 2015;10(1):11-16.
- Parasana JS, Leua HN, Ray NR. Effect of different growing medias mixtures on germination and seedling growth of mango (*Mangifera indica* L.). *The Bioscan*. 2013;8(3):897-900.
- Patel MS, Nurbhanej KH, Rathod MJ, Vyas SV, Bhutiya NH. Effect of Media and GA₃ on Seed Germination of Custard Apple (*Annona squamosa* L.) cv. Sindhan. *Int. J. Pure App. Biosci*. 2017;5(4):969-975.
- Prajapati DG, Satodiya BN, Desai AB, Nagar PK. Influence of storage period and growing media on seed germination and growth of acid lime seedlings (*Citrus aurantifolia* Swingle) cv. Kagzi. *J. Pharmacogn. Phytochem*. 2017;6(4):1641-1645.
- Tandon K, Gurjar PKS, Lekhi R, Soni D. Effect of

Organic Substances and Plant Growth Regulators on Seed Germination and Survival of Tamarind (*Tamarindus indica* L.) Seedlings. *Int. J. Curr. Microbial. App. Sci*. 2019;8(2):2270-2274.

- Yadav RK, Jain MC, Jhakar RP. Effect of media on growth and development of acid lime (*Citrus aurantifolia* Swingle) seedling with or without Azotobacter. *African J. Agric. Res*. 2012;7(48):6421-6426.
- Pawar AB, Kretschmar I. Fabrication, assembly, and application of patchy particles. *Macromolecular rapid communications*. 2010 Jan 18;31(2):150-168.