The Pharma Innovation Journal 2023; 12(6): 4667-4670

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(6): 4667-4670

www.thepharmajournal.com
Received: 20-03-2023
Accepted: 26-04-2023

Bhumika Banjare
Department of Plant Physiology, Agriculture Biochemistry and Medicinal and Aromatic Plants, IGKV, Raipur, Chhattisgarh, India

SP Tiwari
Department of Plant Physiology, Agriculture Biochemistry and Medicinal and Aromatic Plants, IGKV, Raipur, Chhattisgarh, India

Manendra Kumar Ghritlahare
Department of Plant Physiology, Agriculture Biochemistry and Medicinal and Aromatic Plants, IGKV, Raipur, Chhattisgarh, India

Kavita Sahu
Department of Plant Physiology, Agriculture Biochemistry and Medicinal and Aromatic Plants, IGKV, Raipur, Chhattisgarh, India

Corresponding Author:
Bhumika Banjare
Department of Plant Physiology, Agriculture Biochemistry and Medicinal and Aromatic Plants, IGKV, Raipur, Chhattisgarh, India

Effect of growth media and plant growth regulators on growth attributes of orchid (*Dendrobium* L.)

Bhumika Banjare, SP Tiwari, Manendra Kumar Ghritlahare and Kavita Sahu

Abstract
Dendrobium is a significant orchid genera that are raised commercially for cut flowers. Evaluation of its growth pattern and flowering behaviour under different growth media is essential. Four different types of growth media were used to control the growth of the orchid. Four treatment of plant growth regulators, (GA_3:150 ppm, Kinetin: 100 ppm and $AgNO_3$:30 ppm) were applied along with control (Water spray) to elucidate the effect of plant growth substances on flower quality. The important parameters encompassed in the research study leaf area, leaf chlorophyll content, flower bud initiation (days), number of spike, spike length and spike girth. Study revealed that among the different growth media maximum leaf area (24.30 cm^2) were recorded in cocopit media, leaf chlorophyll content (SPAD) (53.54) recorded highest in charcoal media, Minimum days was required for flower bud appearance in combination of Charcoal+Kinetin:100 ppm (23 days), Number of spike per plant was found higher in combination of Charcoal media+GA_3:150 ppm (2.6), Spike girth significantly increased by Charcoal media (2.0 cm) and Kinetin:100 ppm (1.90 cm).

Keywords: Orchid, growth media, gibberelin, kinetin, charcoal

Introduction
Orchids are a diverse and beautiful family of flowering plants. They are known for their unique and intricate blooms, which come in a wide range of colors, shapes and sizes. There are over 25,000 species of orchids, making them one of the largest families of flowering plant. They can be found all over the world, from tropical rain forests to arctic tundras. Orchids are epiphytic in nature. Due to the beauty and variety of their resilient and vibrant blossoms, orchids, especially *Dendrobiums*, take the top rank among floricultural plants. The majority of the country's orchid cultivation area is now taken up by *Dendrobium* due to the simplicity of management techniques and easy access to hybrids from private importers (Rajeevan and Sobhana, 1993) [7]. They have a reputation for being difficult to grow, but with the right care and attention, they can thrive in a variety of environments. Orchids require specific growing condition such as right amount of light, humidity and temperature. *Dendrobium* cultivation is a very lucrative business yet, due to a lack of infrastructure, commercial cultivation has not gained much popularity in India. Infrastructure and a variety of agro climatic conditions that make it difficult to cultivate on open land. As a consequence, the current experiment was conducted in a shade net house. Hybrid orchids need the right amount of nutrients for growth and flowering. The pace is slow. The type of nutrients and growth regulators, their quality, and their frequency of application all have a significant impact on the flower's quality. Orchids have been discovered to respond quite well to conventional nutritional treatment in liquid form. Water soluble fertilizer have been best for epiphytic plants. It helps in releasing proper amount of nutrient in the root zone of orchids. Growth regulators are also essential for the development and growth of orchids. To sustain quality and production, the proper nutritional balance and growth regulator are crucial. The two primary phytohormones that are beneficial for orchid plants are gibberellin and kinetin. Hence, a mixture of nutrients, growth media, and various dosages of growth regulators such GA_3 and kinetin were used. (Sakai *et al*., 2000) [9].

Material and Method
The present study Effect of growth media and plant growth regulators on growth attributes of Orchid (*Dendrobium* L.) was conducted at the Department of Plant Physiology, Agricultural Biochemistry, Medicinal and Aromatic Plant under shade net house, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh.

The experiment used a Factorial completely randomized design with four treatment combinations and three replications. The orchid cultivar *Dendrobium* L. was used in the experiment. *Dendrobium* plants of the same size were rooted in various growing media in perforated plastic pots with one or two pseudobulbs. This is the most significant genus for growing commercially. Each of the four treatments gets 30 pots, which are then replicated three times. During the experiment, a total of 120 pots are used, and 30 of them are placed on benches. Coconut husk (T_1), Sawdust (T_2), Vermicompost (T_3), and Charcoal (T_4) comprised the four growth media. The four components of the treatment are Control (water spray), GA_3:150 ppm, Kinetin: 100 ppm, and $AgNO_3$:30 ppm. These various GA_3, Kinetin, and $AgNO_3$ concentrations were applied on the each pot. At 30 days after planting, the first foliar spray was sprayed out early in the day. Following the wetting agent, the second application was made 45 days after planting, and the third application was made 60 days later. It has been found that the optimal nutrient medium for epiphytic orchids is water soluble fertilizer. By releasing vital plant nutrients at the root zone, where they are easily absorbed and used elsewhere in the plant system, it benefits in fertigation. At 0.1% concentration, NPK 19:19:19, 12:46:0 was attempted and fertigated three times per week. It enhances the plant's vegetative and reproductive activity.

Result and Discussion

The information on leaf area (cm^2), leaf chlorophyll content (SPAD) flower bud initiation (days), spike number, spike length (cm), spike girth (cm) of the orchid (*Dendrobium* L.). The various types of growth media and plant growth regulators had a considerable impact on this.

Leaf Area

Compared to sawdust and vermicompost media, cocopit media had the highest leaf area at 24.30 cm^2, followed by charcoal media at 21.68 cm^2. Due to its propensity to store moisture and nutrients that are slowly absorbed, coconut husk medium produced leaves with a large leaf area. (S. Saravanan, 1993) [8].

Leaf chlorophyll content (SPAD)

Leaf chlorophyll content (SPAD) value has significantly differ within four growth media. The value found highest in Charcoal media (53.54) followed by, Vermicompost (47.13) also reported by M. Sanghamitra, 2019 [6], Ali Salehi, 2014 [1].

Flower bud initiation

Flower bud initiation occurred between 23 and 26.75 days. Charcoal medium (23 days) was discovered to be substantially the best for bud initiation out of all the growth media. Due to its densely packed pore space and aeration restrictions, sawdust media may have caused a delay in the beginning of floral buds. Days to flower bud initiation were significantly impacted by the use of treatment reported by Singh, 2006 [10] and Das & Bhattacharjee, 2004 [4]. The days to floral bud initiation were found to be most significantly shortened from, Kinetin: 100 ppm (23.25 days), followed by, $AgNO_3$: 30 ppm (24 days), and, GA_3:150 ppm (24.16 days). (Figure 1).

Table 1: Leaf area and SPAD value of orchid (*Dendrobium*) in different growth media

Treatments	Leaf Area(cm^2)	SPAD value
T_1	24.3	39.26
T_2	16.74	37.36
T_3	16.4	47.13
T_4	21.68	53.54
mean	19.78	44.32
SD	3.860	7.459
SE(m)	0.44	2.40
CD (5%)	1.71	9.25
CV (%)	3.92	9.41

Number of spike

There was non significant difference between different growth media and nevertheless, charcoal media had the most spikes (2.5), which was superior to sawdust (1.8) and cocopit (1.7). However, the effect of treatments on the number of spikes varied significantly. GA_3:150 ppm, Kinetin:100 ppm, and $AgNO_3$:30 ppm recorded the highest number of spikes (2.1). High concentrations of kinetin were discovered to be an efficient flower-producing trigger, combined with high concentrations of GA_3. (Swapna, 2000) [11]. (Figure 2)

Spike length

Spike length (cm) differs significantly among the growing media. The longest spikes among the growth medium were found in charcoal (45.16 cm), followed by vermicompost (37.72 cm). The impact of plant growth ingredient was shown to differ significantly with respect of spike length, although, The control treatment had the largest impact and spike length (41.04 cm), followed by GA_3:150 ppm (40.03 cm). In respect to spike girth, it was discovered that the interactions between growth media and growth regulator were significantly different. GA_3 had less of an impact on spike production than Benzyl adenine. James Brasch (2000) [5] and Chong Jin Goh and Joseph Arditti (1981) [3]. (Figure 3)

Spike girth

Spike girth was significantly increased by, charcoal media (2.0 cm). The application of plant growth substances also exhibit significant impact on improving spike girth. Among the treatment, kinetin:100 ppm found significantly higher impact and average spike girth was (1.90 cm) followed by, GA_3:150 ppm (1.77cm) and, $AgNO_3$:30 ppm (1.65 cm). Spike girth was considered as an important factor for determining post harvest life of flower, because higher spike girth would gave better storage reserve of carbohydrates for utilization of the flower for longer period of time. The nutrients along with Kinetin would have been translocated in the pseudobulb and spike girth was triggered by the action of cytokinin. Improvement of translocation efficiency due to treatment effect might be the reason for increased spike girth of the *Dendrobium*. (Chong Jin Goh and Joseph Arditti, 1981) [3]. (Figure 4).

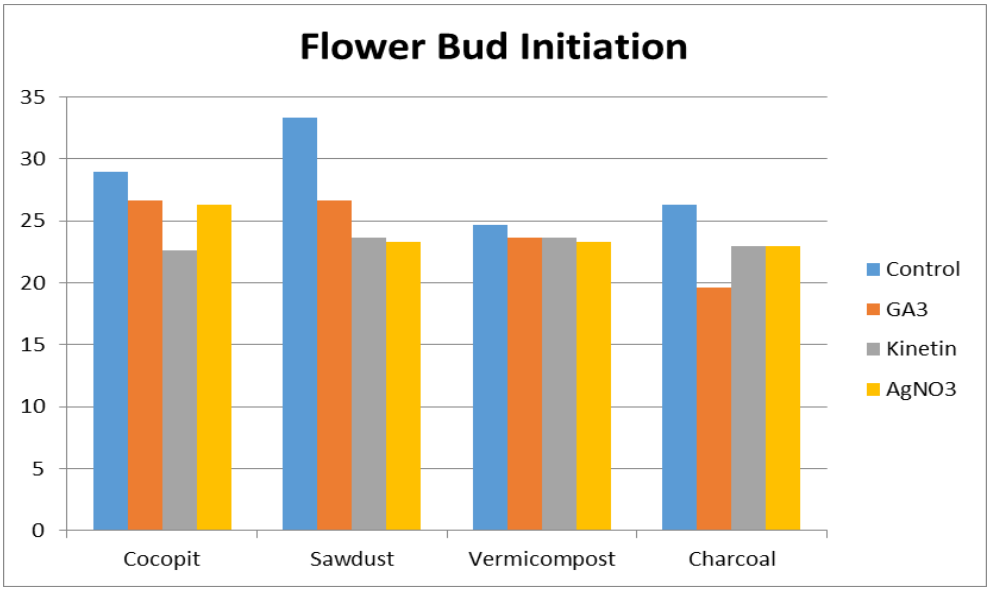

Fig 1: Effect of plant growth substance and growth media on Flower bud initiation (days)

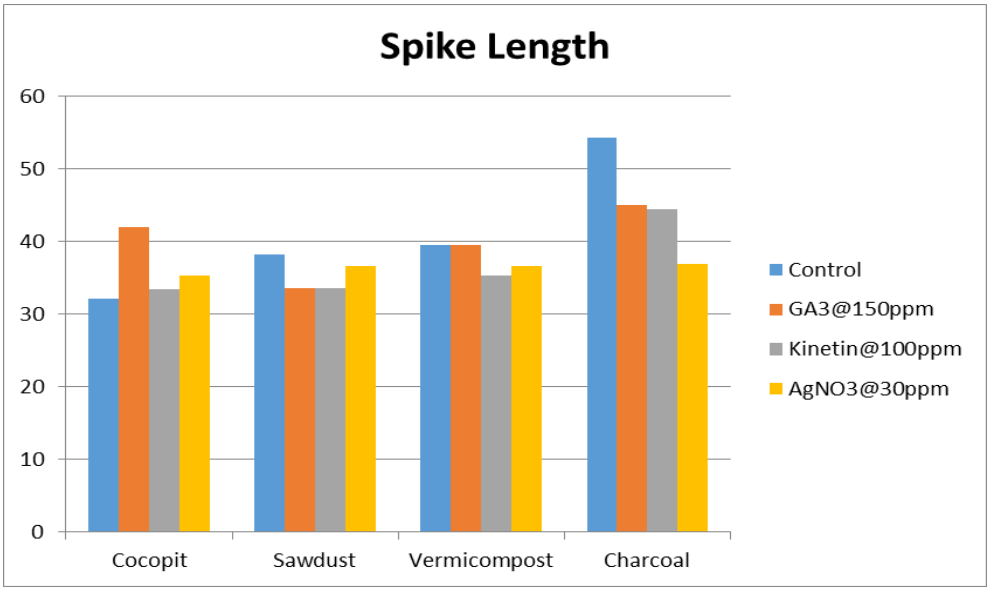

Fig 2: Effect of plant growth regulator and growth media on number of spike per plant

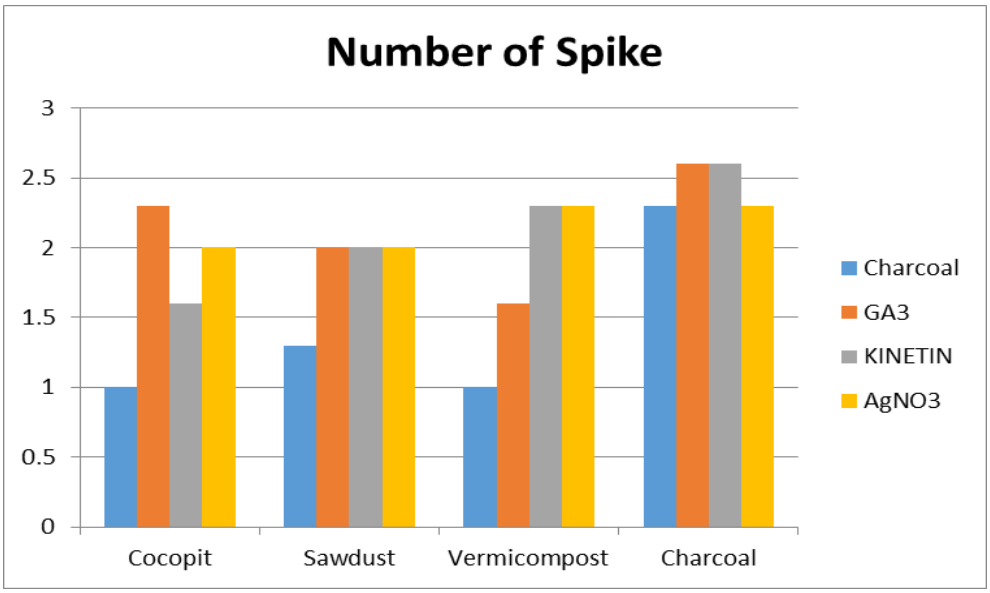

Fig 3: Effect of plant growth regulator and growth media on number of spike per plant

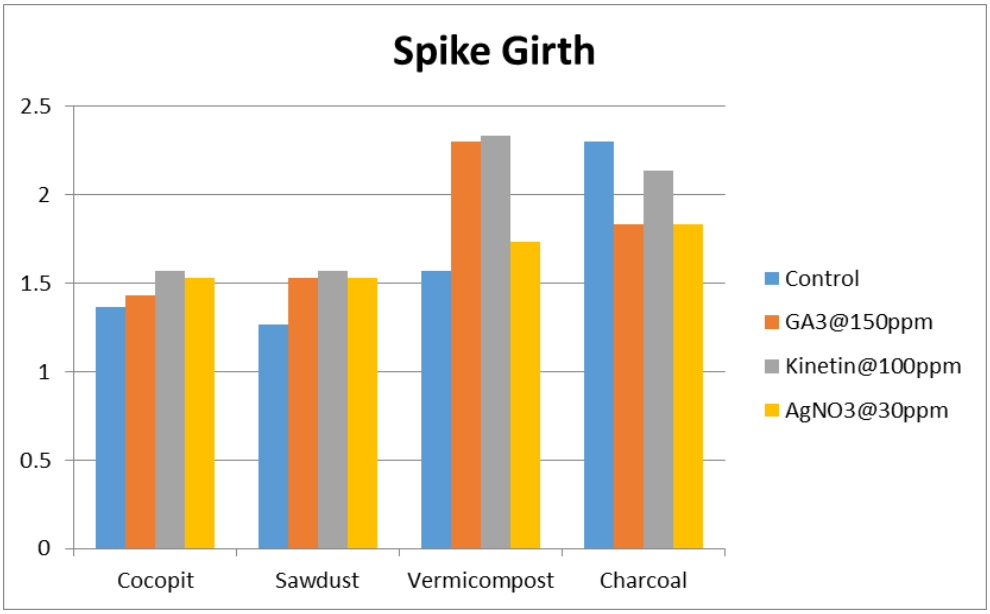

Fig 4: Effect of plant growth regulator and growth media on number of spike girth (cm)

Conclusion

The result in the present investigation shows that coconut husk and charcoal media are the most effective alternatives for orchid growth media. The two kinds of media have an excellent ability of retaining water, which is more preferable for epiphytic orchids. Application of Kinetin: 100 ppm was found to be helpful in achieving greater efficacy of floral bud initiation, spike girth, and spike number. Application of GA_3:150 ppm was retrieved to be effective for spike length and spike number.

Reference

1. Ali Salehi Sardoei. Vermicompost effects on the growth and flowering of marigold (*Calendula officinalis*). European Journal of Experimental Biology. 2014;4(1):651-655.
2. Chen W, Lin Z, Liu Z, Yang L, Chan W. Gibberellin and temperature influence on carbohydrate content and flowering in *Phalaenopsis.* J Physiologia Plantarum. 1994;90(2):391-395.
3. Chong-Jin Goh, Joseph Ardditti. Regulation of flowering in orchids. Orchid Rev. 1981;89(1051):354-355.
4. Das SP, Bhattacharjee SK. Orchids: In: Advances in Ornamental Horticulture (Ed. Bhattacharjee, S. K.), 2004;2:1-65.
5. James Brasch D. Plant growth regulators. The magazine of the American Orchid Society; c2000. p. 251-257.
6. Sanghamitra M. Role of potting media in the cultivation of orchids- A Review. Int. J Curr. Microbial. App. Sci. 2019;8(1):218-223.
7. Rajeevan PK, Sobhana A., Performance of certain epiphytic orchid species in central Kerala. J Orchid Soc. India. 1993;7(1-2):31-35.
8. Saravanan S. Studies on standardization of certain production technologies for Dendrobium orchid hybrid Sonia-17. Thesis submitted to Tamil Nadu agricultural university; c1993.
9. Sakai WS, Adams C, Braun G. Pseudobulb injected growth regulators as aids for year around production of Hawaiian Dendrobium orchid cutflowers. Acta Hort. 2000;541:215-220.
10. Singh AK. Orchids: In Flower Crops: Cultivation and Management; c2006. p. 269-296.
11. Swapna S. Regulation of growth and flowering in *Dendrobium* hybrid Sonia17, Ph.D. Thesis, Kerala Agricultural University, Vellanikkara, Thirussur, Kerala; c2000.