Biological Forum
an International Journal (SI-AAAS: CS March 21&22, 2025)
17(5a): 101-106(2025)

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Optimizing Propagation Media for Improved Rooting and Growth in Stool Shoots of 'Gisela 5' Cherry Rootstock

Verma P.[1], Sharma N.C.[2], Verma P.[3] and Dhiman A.[4]*
[1]*Ph.D. Scholar, Department of Fruit Science, Dr. YSP UHF, Nauni (Himachal Pradesh), India.*
[2]*Associate Professor, Department of Fruit Science, Dr. YSP UHF, Nauni (Himachal Pradesh), India.*
[3]*Assistant Professor, Department of Fruit Science, Dr. YSP UHF, Nauni (Himachal Pradesh), India.*
[4]*Assistant Professor, Department of Fruit Science, KVK, Tabo (Himachal Pradesh), India.*

(Corresponding author: Verma P.)*
(Received: 31 March 2025; Accepted: 03 May 2025; Published online: 15 May 2025)
(Published by Research Trend)

ABSTRACT: The present investigation entitled "Optimizing propagation media for improved rooting and growth in stool shoots of 'Gisela 5' cherry rootstock" was carried out in Dr. YS Parmar University of Horticulture and Forestry, Nauni, Himachal Pradesh, India during 2022-2023. The experiment consists of 5 levels of rooting media (cocopeat, sawdust, vermicompost, sawdust + vermicompost and soil). Each treatment was replicated five times in a randomized block design. The results revealed that stool shoots mounded with cocopeat exhibited maximum percentage of rooted stool shoots (89.34%), rootstock height (137.84 cm), diameter (11.65 mm), number of shoots (6.80), fresh and dry weight of shoots (130.36 g and 80.20 g, respectively), number of main roots (11), length of longest root (40.13 cm), root diameter (6.25 mm), and fresh and dry weight of roots (60.16 g and 37.72 g, respectively), leaf chlorophyll content (2.34 mg/g fresh weight), photosynthetic rate (11.26 µmol $CO_2 m^{-2}s^{-1}$), transpiration rate (5.01 mmol H_2O $m^{-2}s^{-1}$) and stomatal conductance (0.32 mol H_2O $m^{-2}s^{-1}$). From the results of the present investigation, it could be concluded that planting of stool shoots under cocopeat propagation media was most effective treatment for clonal propagation of cherry rootstock 'Gisela 5' through mound layering to produce higher percentage of rooted stool shoots with good root and shoot system to be used as quality rootstocks.

Keywords: Gisela, Mound layering, Prunus avium, Rooting media, Root and shoot growth.

INTRODUCTION

Sweet cherry (*Prunus avium* L.), belonging to the family Rosaceae and subfamily Prunoideae, is a widely valued temperate fruit known for its exquisite taste and economic importance (Wunsch and Hormaza 2004). It is thought to have originated in parts of Europe and southern Asia (Faust and Surányi 1997), with additional evidence pointing to a limited native range in the western Himalayas (Vignati *et al.*, 2022). This deciduous species can grow up to 15–32 meters tall, with a trunk circumference of around 1.5 meters. Its fruits are not only visually appealing but also nutritionally dense, offering higher calorific content than apples.

In recent years, global production of sweet cherry has demonstrated a gradual increase, reaching an estimated 2.5 million metric tons annually (FAOSTAT, 2023; Bujdosó and Hrotkó 2017). The crop is primarily cultivated within latitudinal ranges of 35°N to 55°S, with Russia, the USA, Italy, Germany, and France leading global production. In India, cherry cultivation is mainly practiced in the temperate zones of Jammu & Kashmir, Himachal Pradesh and Uttarakhand, typically at elevations of 2000–2700 meters above sea level where the crop's chilling requirement of 1000–1500 hours is adequately met. Himachal Pradesh accounts for about 448 hectares under cherry cultivation, producing roughly 981 metric tons annually, with Kullu and Shimla being the key growing regions (Anonymous, 2023; Chauhan, 2024).

A major bottleneck in cherry cultivation in India is the limited availability of quality planting material, leading to poor propagation success. This challenge can be overcome by utilizing clonal rootstocks (Verma *et al.*, 2024) and identifying appropriate propagation media to improve rooting efficiency and plant establishment. Clonal propagation is particularly significant as it ensures genetic uniformity and produces true-to-type planting material. Clonal rootstocks are commonly propagated by vegetative methods such as mound layering, trench layering, stem cuttings, and micropropagation, with mound layering being the most widely practiced at the commercial level (Sharma and Kumar 2019). The selection of rootstock plays a critical role in determining the growth, yield potential, fruit quality, and overall orchard performance of the grafted cultivar (Tsipouridis and Thomidis 2005). The traditionally used rootstock *Paja* (*Prunus cerasoides*) has fallen out of favor due to issues like delayed graft incompatibility (Parmar and Bist 1992). More recently, semi-dwarf rootstocks like 'Gisela 5' have shown promise in optimizing cherry tree vigour and productivity under high-density orchard systems (Cantin *et al.,* 2010; Sitarek and Grzyb 2010). A hybrid between *P. cerasus* and *P. canescens*, 'GiSelA 5' is characterized by early maturity, good cold tolerance, and responsiveness to well-managed, fertile soils with supplemental irrigation (Zimmermann, 1994; Sitarek *et al.,* 2005; Chauhan, 2024). Its adoption is considered a breakthrough for efficient and profitable cherry cultivation in temperate climates.

Another key factor influencing the success of propagation is the rooting medium. The type of media used directly affects the rooting potential of cuttings by providing a balance of aeration, moisture, nutrients, and physical support (Tsipouridis *et al.,* 2005). Ideal rooting substrates typically possess 20–35% moisture content, around 60% porosity, 30–40% aeration, and a pH range of 6.0–6.8 (Nanda and Kochhar 1985). A range of materials—such as soil, sand, vermiculite, perlite, sawdust, sphagnum moss, peat, and compost—can be used depending on the species and propagation response. Keeping in view the above facts, the present study aims to identify the most suitable propagation media for the successful commercial multiplication of cherry clonal rootstock 'GiSelA 5' under sub-temperate conditions of the North Western Himalayas through mound layering.

MATERIAL AND METHODS

The present investigation was carried out during the year 2022-2023 at the nursery block of Dr. Yashwant Singh Parmar University of Horticulture and Forestry, Nauni, Solan, Himachal Pradesh, India. The experimental site is situated at an altitude of 1193 meters above mean sea level, located at 30°51'23" N latitude and 77°09'36" E longitude. The area experiences a sub-temperate climate with moderately warm summers and cold winters, and receives an average annual rainfall ranging between 800 and 1300 mm. The experiment consisted of five treatments using different propagation media: cocopeat, sawdust, vermicompost, sawdust mixed with farmyard manure (FYM), and soil and laid out in a Randomized Block Design with five replications.

One-year-old mother stool beds of the cherry clonal rootstock 'Gisela 5' were established at the site. New stool shoots that emerged during the spring season were girdled near their base when they attained a height of 25 to 30 cm. These shoots were then treated with 3500 ppm Indole-3-butyric acid and subsequently covered with the respective propagation media. In case of mixtures, the components were combined in equal proportions on a volume basis and thoroughly mixed prior to application. Cocopeat bricks were soaked in water to allow easy disintegration into fine coir dust. All recommended cultural practices, including timely hoeing, weeding, irrigation and plant protection measures were regularly followed to ensure healthy growth and maintenance of stool beds.

A. Observations noted

Percentage of rooted cuttings was observed after uprooting the stool shoots in December. The number of total and rooted daughter stools out of total mother stool was recorded and expressed in percentage.

Observations on morphological parameters were recorded at the end of the growing season in December. Rootstock height was measured from the ground level to the tip of each shoot using a measuring tape. The diameter of the rootstock and adventitious roots was measured with the help of a digital Vernier caliper. The total number of shoots and main roots per plant was determined by manual counting and expressed as averages. The total length of roots was measured with the help of root length scanner (BIOVIS PSM R2000). Fresh weights of shoots and roots were recorded using a top-pan electronic balance, while dry weights were obtained after oven-drying the samples at a temperature of 65 ± 5°C until constant weight was achieved.

Leaf chlorophyll content in leaves were estimated by the dimethyl sulfoxide method (Hiscox and Israelstam 1979). The absorbance (OD-optical density) for the respective method was determined using a spectrophotometer (NUKES, Canada). Photosynthesis-related observations, including the photosynthesis rate, transpiration rate and stomatal conductance were recorded using the LI-6400XT (LI-COR) portable photosynthesis system.

B. Statistical analyses

The experimental data were subjected to statistical analysis using excel and OPSTAT software, and the results were expressed as treatment means for comparison.

RESULTS AND DISCUSSION

The application of different propagation media had a significant influence on the percentage of rooting success in 'Gisela 5' cherry rootstock (Fig. 1). Among all the treatments, the stool shoots mounded in cocopeat (T_1) exhibited the highest percentage of rooted cuttings (89.34%), which was significantly higher as compared to all other treatments. However, lowest percentage of rooted cuttings (56.79%) was obtained under control treatment (T_5).

The persual of data (Table 1) indicates that different propagation media significantly influenced the growth parameters of 'Gisela 5' rootstock. Among different variables of 'Gisela 5' rootstock, maximum rootstock height (137.84 cm) was recorded under T_1 (cocopeat) which was statistically at par with sawdust media (136.49 cm). Similarly, maximum diameter (9.26 mm) and number of nodes (4.80) was recorded under cocopeat propagation media (T_1). Whereas, minimum rootstock height (84.91 cm), diameter (11.65 mm) and number of nodes (6.80) of stool shoots was observed with soil (T_5). The perusal of data depicted in Fig. 2 indicates that different propagation media significantly influenced the rootstock height. It is of much importance that there was 41.75, 34.02, 22.68 and 7.99 per cent increase in rootstock height under T_1, T_2, T_3 and T_4 respectively over control. These increments underscore the superior performance of cocopeat over other media, reinforcing its potential as an effective substrate for enhancing rooting efficiency and vegetative growth in cherry rootstock propagation. The appraisal of data (Table 1) reveals that different propagation media had a marked influence on fresh as well as dry weight of shoots. The maximum fresh weight of shoot (130.36 g) and dry weight of shoot (80.20 g) was recorded under treatment T_1 (cocopeat), while minimum fresh weight of shoot (52.48 g) and dry weight of shoot (37.08 g) was exhibited by soil (T_5).

The superior performance of treatment T_1 (cocopeat) as rooting medium in terms of rootstock height, stem diameter, shoot number and fresh and dry weight of shoots can be attributed to its favourable rooting response, which enhanced nutrient absorption. This, in turn, promotes vegetative growth. Cocopeat is widely recognized for its excellent physical characteristics, including high porosity, efficient water-holding capacity, and good aeration, which collectively contribute to a favorable root-zone environment. Additionally, its biodegradability and resistance to microbial breakdown (Maharani *et al*., 2010) make it a sustainable and reliable medium for plant propagation. These properties of cocopeat, maintains the adequate moisture around the root zone and support optimal turgor pressure in plant cells, which is critical for cell elongation and expansion. Consequently, plants grown in cocopeat exhibit more robust shoot development and greater overall vigor, as reflected in the significantly higher shoot weights and morphological traits observed in the present study.

Cocopeat also facilitated superior root development, likely due to its excellent aeration and drainage properties, which allowed unrestricted root expansion. Improved root formation enabled more efficient uptake of water and nutrients, which were translocated to the shoots. These findings align with those of Sahu *et al*. (2022), who observed significant improvements in growth parameters such as height, stem diameter, leaf number and leaf area in papaya seedlings grown in a cocopeat and peat moss mixture.

The appraisal of data (Table 2) reveal that different propagation media had a marked influence on the rooting variables of 'Gisela 5' rootstock. Among the propagation media, the stool shoots subjected to cocopeat propagation media (T_1) exhibited maximum number of roots (11), length of longest root (40.13 cm) and root diameter (6.25 mm). in contrast, minimum number of roots (7.76), length of longest root (23.30 cm) and root diameter (3.52 mm) was observed under soil (T_5). It is clear from the data presented in Table 2 that fresh and dry weight of roots was significantly influenced by propagation media. The maximum fresh weight of root (60.16 g) and dry weight of root (37.72 g) was obtained with cocopeat propagation media (T_1). While, minimum fresh weight of root (30.72 g) and dry weight of root (17.16 g). The perusal of data depicted in Fig. 3 shows that different propagation media significantly impacted the length of longest root and fresh weight of roots in mound stool shoots of 'Gisela 5' cherry rootstock. There was an increase of 72.23, 47.34, 44.33 and 39.66 per cent and 95.83, 56.77, 32.36 and 4.17 per cent in length of longest root and fresh weight of roots, respectively with respect to T_1, T_2, T_3 and T_4 respectively over control. The data depicted in Fig. 4 clearly show that different propoagtion media had a significant influence on the root length of 'Gisela 5' cherry rootstock. Considering different propagation media, highest root length (7.42 m) was recorded under cocopeat media (T_1). Whereas, minimum root length (5.23 m) was noticed in stool shoots planted in soil (T_5).

The maximum number of main roots, length of longest root, root diameter, fresh and dry weight of roots of 'Gisela 5' cherry rootstock was recorded from plants treated with cocopeat (T_1). The enhanced root growth can be partly attributed to cocopeat's capacity to stabilize nutrient availability and mitigate fluctuations in soil temperature (Hartmann *et al*., 2007). Moreover, the presence of cytokinins in cocopeat may have stimulated the formation of adventitious roots, as suggested by Ellyard and Ollerenshaw (1984), contributing to the higher root count observed.

The increased fresh and dry weight of roots may be due to the development of more robust roots, improved food accumulation and extended root length, alongside biochemical changes such as enhanced amino acid metabolism during root regeneration (Singh and Pandey 2009). These results corroborate earlier studies by Atak and Yalcin (2015); Parmar *et al*. (2018), who identified cocopeat as an effective rooting medium for kiwifruit and guava cuttings, respectively.

The appraisal of data (Table 3) reveal that different propagation media had a marked influence on the leaf chlorophyll content, photosynthetic rate and transpiration rate as well as stomatal conductance. Among different propagation media, stool shoots of 'Gisela 5' mounded with cocopeat media (T_1) exhibited significantly higher leaf chlorophyll content (2.34 mg/g fresh weight) and photosynthetic rate (11.26 μmol $CO_2 m^{-2} s^{-1}$), while minimum leaf chlorophyll content (1.85 mg/g fresh weight) and photosynthetic rate (9.58 μmol $CO_2 m^{-2} s^{-1}$) was noted under treatments (T_5) where shoots were mounded with soil only. In case of transpiration rate, maximum value (5.01 mmol H_2O $m^{-2} s^{-1}$) was recorded under T_1 (cocopeat), which was closely followed by T_2 (sawdust), whereas, minimum values (3.08 mmol H_2O $m^{-2} s^{-1}$) was recorded under T_5 (control). Stool shoots of cherry rootstock mounded with cocopeat (T_1) had highest stomatal conductance (0.32 mol H_2O $m^{-2} s^{-1}$), while lowest stomatal conductance (0.19 mol H_2O $m^{-2} s^{-1}$) was recorded under T_5 (control) which was statistically at par with T_4.

Different propagation media had a significant effect on leaf chlorophyll content, photosynthetic rate, transpiration rate and stomatal conductance in stool shoots of cherry rootstock 'Gislea-5'. A significant increase in physiological traits of stool shoots was observed with cocopeat propagation media (T_1) which could be attributed to its favorable physical properties, such as high porosity, optimal water-holding capacity, and enhanced aeration. These characteristics create a conducive environment for sustained root zone moisture and oxygen availability, which are critical for physiological functioning and overall plant health. Enhanced water availability under cocopeat likely maintains adequate guard cell turgor, leading to improved stomatal aperture and increased CO_2 uptake, which directly supports higher photosynthetic activity (Chauhan, 2024). Additionally, increased cell expansion and greater leaf area under optimal substrate conditions can further boost light interception and metabolic activity, thereby improving chlorophyll synthesis, transpiration, and overall photosynthetic efficiency. The findings of the present study are consistent with those of Dhatrikarani (2019) in guava and Islam *et al.* (2023) in strawberry. These findings align with those of Chauhan (2024), who recorded maximum leaf chlorophyll content, photosynthetic rate, transpiration rate and stomatal conductance in 'Gisela 6' cherry rootstock mounded with cocopeat propagation media.

Table 1: Effect of different propagation media on the growth performance of stool shoots in 'Gisela-5'cherry rootstock.

Treatments	Rootstock height (cm)	Rootstock diameter (mm)	Number of shoots	Fresh weight of shoot (g)	Dry weight of shoot (g)
T_1 - Cocopeat	137.84	11.65	6.80	130.36	80.20
T_2-Sawdust	136.49	10.48	6.20	125.56	79.84
T_3 -Vermicompost	125.96	9.96	5.40	82.80	51.48
T_4 -Sawdust+ FYM	111.66	9.32	5.20	64.96	37.04
T_5 -Control (Soil)	84.91	9.26	4.80	52.48	37.08
$CD_{0.05}$	3.06	0.31	0.15	3.13	1.06

Table 2: Effect of different propagation media on the root parameters of stool shoots in 'Gisela-5'cherry rootstock.

Treatments	Number of roots	Length of longest root (cm)	Root diameter (mm)	Fresh weight of root (g)	Dry weight of root (g)
T_1 - Cocopeat	11.00	40.13	6.25	60.16	37.72
T_2-Sawdust	10.40	34.33	5.59	48.16	29.64
T_3 -Vermicompost	9.52	33.63	4.72	40.66	25.64
T_4 -Sawdust+ FYM	8.38	32.54	3.80	32.00	20.88
T_5 -Control (Soil)	7.76	23.30	3.52	30.72	17.16
$CD_{0.05}$	0.18	0.96	0.16	0.78	0.62

Table 3: Effect of different propagation media on the physiological parameters of stool shoots in 'Gisela-5'cherry rootstock.

Treatments	Leaf chlorophyll content (mg/g fresh weight)	Photosynthetic rate (μmol $CO_2 m^{-2}s^{-1}$)	Transpiration rate (mmol H_2O $m^{-2}s^{-1}$)	Stomatal conductance (mol H_2O $m^{-2}s^{-1}$)
T_1 - Cocopeat	2.34	11.26	5.01	0.32
T_2-Sawdust	2.17	10.97	4.92	0.28
T_3 -Vermicompost	2.03	10.21	4.87	0.21
T_4 -Sawdust+ FYM	1.94	9.96	4.29	0.20
T_5 -Control (Soil)	1.85	9.58	3.88	0.19
$CD_{0.05}$	0.05	0.25	0.13	0.01

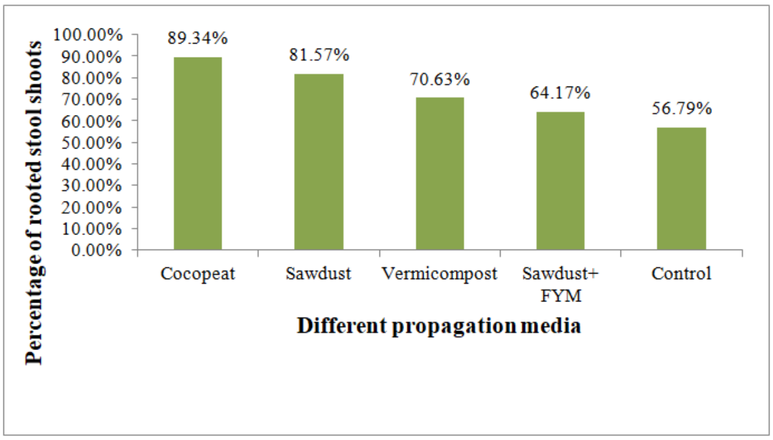

Fig. 1. Effect of different propagation media on the percentage of rooted stool shoots in 'Gisela-5'cherry rootstock.

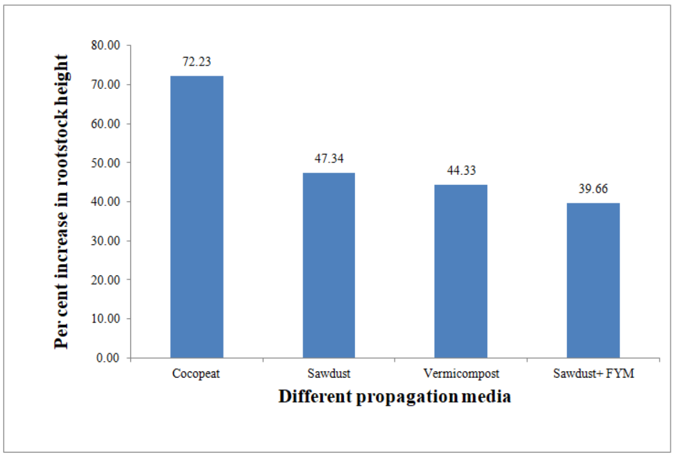

Fig. 2. Effect of different propagation media on per cent increase in rootstock height over control.

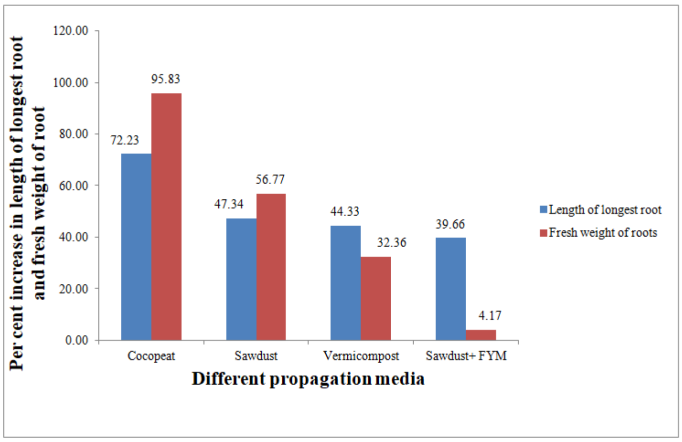

Fig. 3. Effect of different propagation media on per cent increase in length of longest root and fresh weight of roots over control.

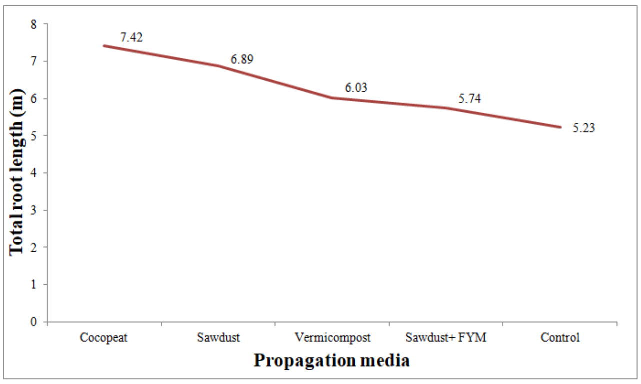

Fig. 4. Effect of different propagation media on the total root length in 'Gisela-5'cherry rootstock.

CONCLUSIONS

The study aimed to identify the most effective rooting medium for enhancing root initiation and vegetative growth of stool shoots in 'Gisela 5' cherry rootstock. Among the media evaluated, cocopeat proved significantly superior in promoting highest percentage of rooting in stool shoots and both root and shoot development. Thus, cocopeat is recommended as the optimal substrate for mound layering of 'Gisela 5' to ensure the production of high-quality planting material.

FUTURE SCOPE

Future studies may focus on integrating cocopeat with other organic or inorganic components to enhance rooting efficiency and cost-effectiveness. Additionally, investigating the physiological and biochemical responses of rootstocks under different environmental conditions and rooting hormones in combination with cocopeat could provide deeper insights. This research can contribute significantly to the standardization of quality planting material production in high-density cherry orchards.

Acknowledgement. Authors are thankful to the Professor and Head, Department of Fruit Science and Director of Research, Dr. YS Parmar University of Horticulture and Forestry, Solan (India) for providing necessary facilities to carry out this experiment.
Conflict of Interest. None.

REFERENCES

Anonymous (2023). Departmental statistical data at a glance. Government of Himachal Pradesh. https://eudyan.hp.gov.in

Atak, A. and Yalcin, T. (2015). Effects of different applications on rooting of *Actinidia deliciosa* 'Hayward' hardwood and softwood cuttings. *Acta Horticulturae*, *1096*, 117–125.

Bujdosó, G. and Hrotko, K. (2017). Cherry production. In: Quero-García, J., Iezzoni, A., Pulawska, J. and Lang, G. (Eds.), *Cherries: Botany, Production and Uses*. CABI, Wallingford, UK, pp. 1–13.

Cantin, C. M., Pinochet, J., Gogorcena, Y. and Moreno, M. A. (2010). Growth, yield and fruit quality of 'Van' and 'Stark Hardy Giant' sweet cherry cultivars as influenced by grafting on different rootstocks. *Scientia Horticulturae*, *123*, 329–335.

Chauhan, R. (2024). *Studies on propagation of cherry rootstocks through mound layering* (Doctoral dissertation, UHF Nauni).

Dhatrikarani, T. (2019). Effect of rooting media and IBA treatments on shoot and leaf production of terminal cuttings in guava (*Psidium guajava* L.) cv. Taiwan Pink. *Journal of Crop and Weed*, *15*(2), 104–109.

Ellyard, R. K. and Ollerenshaw, P. J. (1984). Effect of indolebutyric acid, medium composition, and cutting type on rooting of *Gravillea johnsonii* cuttings at two basal temperatures. *Combined Proceedings of the International Plant Propagators Society*, *34*, 101–108.

FAOSTAT (2022). https://www.fao.org/faostat/en/#data/QCL (Accessed on 26 October 2022)

Faust, M. and Surányi, D. (1997). Origin and dissemination of cherry. *Horticultural Reviews*, *19*, 263–317.

Hartmann, H. T., Kester, D. E., Davies, F. T. and Geneve, R. L. (2007). *Plant propagation: Principles and practices* (6th ed.). Prentice Hall of India, New Delhi, pp. 684–708.

Hiscox, J. D., and Israelstam, G. F. (1979). A method for the extraction of chlorophyll from leaf tissues without maceration. *Canadian Journal of Botany*, *57*(12), 1332–1334.

Islam, N., Hossain, I. and Choudhury, S. (2023). Impact of different shed houses and growing media on growth, yield and quality of strawberry. *Journal of Agricultural Production*, *4*(1), 30–38.

Maharani, R., Tamai, Y., Takashi, Y. and Terazawa, M. (2010). Scrutiny of physical properties of sawdust from tropical countries wood species: Effect of different mills and sawdust particle size. *Journal of Forestry Research*, *7*, 20–32.

Nanda, K. K. and Kochhar, V. K. (1985). Propagation through cuttings. In: *Vegetative propagation of plants*. Kalyani Publishers, pp. 123–193.

Parmar, C. and Bist, H. S. (1992). Paja – An autumn flowering wild cherry. *HortScience*, *27*(12), 1344–1345.

Parmar, J. P., Tiwari, R., Gautam, K. K., Yadav, L. and Upadhyay, N. (2018). Effect of indole-3-butyric acid (IBA), rooting media and their interaction on different rooting and growth characteristics of air-layers in guava (*Psidium guajava* L. cv. L-49). *Journal of Applied and Natural Science*, *10*(1), 241–246.

Sahu, A. K., Tandel, B. M. and Patel, N. K. (2022). Effect of growing media on germination, growth and nutrient uptake of papaya seedlings (*Carica papaya* L.). *The Pharma Innovation Journal*, *11*(12), 682–686.

Sharma, R. and Kumar, A. (2019). Influence of indole butyric acid on propagability of clonal rootstock of *Prunus* species through cuttings and stooling. *Journal of Pharmacognosy and Phytochemistry*, *8*, 2483–2487.

Singh, B. V. and Pandey, S. K. (2009). Influence of growth regulators and rooting medium on promotion of root characters and survival of air-layered guava shoots. *Annals of Plant and Soil Research*, *11*, 120–121.

Sitarek, M. and Grzyb, Z. S. (2010). Growth, productivity and fruit quality of 'Kordia' sweet cherry trees on eight clonal rootstocks. *Journal of Fruit and Ornamental Plant Research*, *18*, 169–176.

Sitarek, M., Grzyb, Z. S. and Omiecińska, B. (2005). Performance of sweet cherry trees on 'Gisela 5' rootstock. *Acta Horticulturae*, *667*, 389–391.

Tsipouridis, C. and Thomidis, T. (2005). Effect of 14 peach rootstocks on the yield, fruit quality, mortality, girth expansion and resistance to frost damages of 'May Crest' peach variety and their susceptibility to *Phytophthora citrophthora*. *Scientia Horticulturae*, *103*, 421–428.

Tsipouridis, C., Thomidis, T. and Michailides, Z. (2005). Factors influencing the rooting of peach GF677 (peach × almond hybrid) hardwood cuttings in a growth chamber. *New Zealand Journal of Crop and Horticultural Science*, *33*, 93-98.

Verma, P., Sharma, N. C., Verma, P., Sharma, U. and Thakur, S. (2024). Studies on the production of budded nursery plants in stool beds of 'Rubira' peach (*Prunus persica* [Linnaeus] Batsch). *Applied Fruit Science*, *66*(3), 887–899.

Vignati, E., Lipska, M., Dunwell, J. M., Caccamo, M. and Simkin, A. J. (2022). Fruit development in sweet cherry. *Plants*, *11*(12), 1531.

Wunsch, A. and Hormaza, J. I. (2004). Molecular evaluation of genetic diversity and S-allele composition of local Spanish sweet cherry (*Prunus avium* L.) cultivars. *Genetic Resources and Crop Evolution*, *51*, 635–641.

Zimmermann, A. (1994). 'Gisela 5', a dwarfing rootstock for sweet cherries from Giessen in a trial. *Obstbau*, *19*, 62–63.

How to cite this article: Verma P., Sharma N.C., Verma P. and Dhiman A. (2025). Optimizing Propagation Media for Improved Rooting and Growth in Stool Shoots of 'Gisela 5' Cherry Rootstock. *Biological Forum, 17*(5a): 101-106.