International Journal of Plant & Soil Science

Volume 37, Issue 9, Page 811-819, 2025; Article no.IJPSS.144143
ISSN: 2320-7035

Economic Evaluation of Gladiolus (*Gladiolus* L.) Genotypes for off Season Cultivation in Sub Temperate Zone

Ragini Bhardwaj [a++*], Puja Sharma [b], Anju Sharma [b] and Manish Kumar [c]

[a] Agrotechnology Division, CSIR-IHBT, Palampur, Himachal Pradesh, India.
[b] Dr. Yashwant Singh Parmar University of Horticulture & Forestry Nauni, Solan Himachal Pradesh, India.
[c] Career Point University Kota Rajasthan, India.

Authors' contributions

This work was carried out in collaboration among all authors. Author RB conducted the entire field trial, data collection, data analysis and manuscript preparation as part of her academic work. She was responsible for executing all major components of the study. Author PS contributed to the conceptualization of the experiment and provided continuous academic guidance throughout the research. Author AS guided the design of the experiment and assisted with the statistical analysis. Author MK contributed to the field work, editing and finalization of the manuscript. All authors read and approved the final manuscript.

Article Information

DOI: https://doi.org/10.9734/ijpss/2025/v37i95756

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://pr.sdiarticle5.com/review-history/144143

Original Research Article

Received: 10/07/2025
Published: 26/09/2025

ABSTRACT

Gladiolus is an economically important ornamental flower, widely grown for its vibrant spikes and commercial value in India. This study assessed the yield and economic performance of eleven gladiolus genotypes (Arka Ayush, Arka Darshan, Arka Kumkum, Arka Naveen, Pratap Glad-1,

[++] Project Associate II;
**Corresponding author: E-mail: ranuleena2311@gmail.com;*

Cite as: *Ragini Bhardwaj, Puja Sharma, Anju Sharma, and Manish Kumar. 2025. "Economic Evaluation of Gladiolus (Gladiolus L.) Genotypes for off Season Cultivation in Sub Temperate Zone". International Journal of Plant & Soil Science 37 (9):811-819. https://doi.org/10.9734/ijpss/2025/v37i95756.*

Punjab Elegance, Punjab Glad-2, Punjab Glance, Punjab Lemon Delight, Pusa Manmohak and Punjab Dawn) over two cropping seasons (2021-2022 and 2022-2023) under naturally ventilated polyhouse conditions. The experiment was conducted at the Floriculture Research Farm, Dr. Y.S. Parmar University of Horticulture and Forestry, Himachal Pradesh, using a Randomized Block Design (RBD) with three replications. Corms were planted in mid-December at 30 cm × 10 cm spacing and 5 cm depth, accommodating approximately 30 plants per square meter. Significant variation was observed among genotypes regarding corm and spike yield as well as gross return, net return and benefit-cost ratio. Punjab Dawn achieved the highest spike and corm production (46,240.00/ 800 m²) with maximum total revenue (₹ 3,69,920.00) and maximum B:C ratio (1.76), making it the most profitable cultivar for offseason cultivation under protected conditions compared to other genotypes under study. These results demonstrate the economic potential of selecting superior genotypes and adopting improved cultivation methods under protected environments. The findings provide practical insights for growers and policymakers to optimize resource allocation, increase profitability and enhance sustainability in gladiolus production.

Keywords: Gladiolus; genotypes; protected cultivation; corm; spike; economic evaluation; B:C ratio.

1. INTRODUCTION

Gladiolus (*Gladiolus* spp.) is one of the leading ornamental flowers in global floriculture, prized for its elegant floral spikes, a wide spectrum of vivid colours and excellent vase life, that make it highly popular in both domestic and commercial markets (Aswath et_al., 2021; Uhlmann et al., 2019). In India, gladiolus cultivation has evolved into a critical segment of the floriculture industry, generating employment and improving rural incomes, particularly for small and medium-scale farmers, while also contributing substantially to the country's foreign exchange earnings through exports (Avilala et al., 2020; Singh et al., 2014). The crop's high adaptability to diverse agro-climatic regions, combined with continuous genetic improvements from breeding programs, supports its expanding market appeal and economic value (Rashmi and Chandrashekar, 2016). Traditionally employed extensively in events, weddings and festivals, gladiolus sustains a consistent demand. However, production continuity is frequently challenged by seasonal constraints, pest and disease infestations and erratic weather patterns, underlining the urgent need for improved cultivation approaches that deliver higher, more reliable yields and ensure profitability for growers (Singh KP et al., 2011).

In this context, protected cultivation techniques most notably polyhouses and shade net houses have emerged as vital innovations that enable floriculture to surmount environmental and biotic stresses. By creating controlled microclimates with optimized temperature, humidity and light parameters, these systems significantly reduce exposure to climatic extremes and pest infestations, promoting healthier plant growth and enhancing flower yields (Bala, 2021; Chahal et al., 2020). Protected cultivation facilitates off-season production, ensuring year-round availability of premium-quality gladiolus spikes and corms, thus stabilizing market supply chains (Bolagam & Natarajan, 2019). However, the adoption of such technologies entails higher initial capital investment (Harish et al., 2023). Given escalating climate uncertainties, protected cultivation also offers farmers resilience and income stability, positioning it as a preferred technology for progressive floriculturists in India (Gao et al., 2023).

India's floriculture landscape benefits from its diverse agro-ecological zones that support extensive gladiolus production, with states including Himachal Pradesh, West Bengal, Sikkim, Jammu & Kashmir, Andhra Pradesh, Uttar Pradesh and Karnataka serving as major contributors (Singh et al., 2024). The latest second advance estimates for 2024–25 as per second advance estimates of Department of Agriculture and Farmers Welfare. India accounts for a total cultivation area of approximately 11,700 hectares producing nearly 180,000 metric tonnes of gladiolus cut spikes annually. The adoption of protected cultivation practices has been pivotal in enhancing both productivity and farmers' profitability. According to APEDA (2023), India's floriculture exports have exhibited a steady growth rate of 8–10% per annum, with primary export markets extending across the Middle East, Europe, and Southeast Asia however meeting the demand for superior-quality planting material remains a challenge, as India continues to import planting material of bulbous ornamentals predominantly from advanced

floriculture countries such as the Netherlands, which supply disease-free, high-yielding bulbs (Rashmi & Chandrashekar, 2016; APEDA, 2023). This ongoing import-export balance highlights the critical need to strengthen domestic production, particularly through the upscaling of protected cultivation technologies, to reduce dependency on imports while ensuring consistent, quality supply throughout the year (Dasondhi, 2006). On the global stage, countries like the Netherlands, Kenya, Colombia and Israel lead in gladiolus production by leveraging advanced protected cultivation systems that yield millions of corms and spikes annually, setting high benchmarks that India aims to emulate through technological and varietal enhancements (FAO, 2023).

Despite several regional genotypic evaluation studies (Sarkar et al.,2014; Kumar, 2020) and economic analyses of open-field gladiolus cultivation detailing cost components, market returns and profitability in India (Avilala et al., 2020; Rashmi & Chandrashekar, 2016), comprehensive empirical research focusing on the economics of protected cultivation remains limited. The latter introduces distinctive cost variables such as infrastructure depreciation, higher energy demands and specialized labour requirements, all of which significantly influence break-even costs and profit margins (Bala, 2021; Chahal et al., 2020). Recent multi-year trials evaluating eleven gladiolus genotypes under protected environments have demonstrated substantial variability in yield potential, flower quality and benefit-cost (B:C) ratios. Integrating genotype performance evaluation with detailed economic analysis is critical for identifying cultivars that maximize profitability and sustainability under protected cultivation, thereby supporting growers in making informed decisions and enabling policymakers to foster scalable floriculture development.

In response to these gaps and opportunities, the present study sets out to conduct a thorough economic evaluation of gladiolus cultivation under protected environment in sub temperate region of India. It aims to meticulously assess all significant fixed and variable cost components and thereby estimate the cost-benefit ratio across eleven gladiolus genotypes and select cultivars demonstrating the best agronomic and economic suitability for protected cultivation. This study aspires to equip Indian floriculturists with data-driven insights essential for optimizing investment and cultivar choices, guide policymakers in projecting floriculture sector growth, and ultimately promote environmentally sustainable and profitable ornamental flower production amid evolving market demands and climatic uncertainties (Singh KP et al., 2011; Uhlmann et al., 2019).

2. MATERIALS AND METHOD

The present study was conducted over two consecutive cropping seasons (December 2021-September 2022 and December 2022 to September 2023) at the Floriculture Research Farm, Department of Floriculture and Landscape Architecture, Dr. Y.S. Parmar University of Horticulture and Forestry, Nauni, Solan, Himachal Pradesh. The experimental site is located at an altitude of 1,275 meters above mean sea level, representing the mid-hill sub-temperate agro-climatic zone of Himachal Pradesh. The primary objective of the study was to evaluate the economic potential of selected gladiolus cultivars under naturally ventilated polyhouse conditions.

Eleven gladiolus cultivars (Arka Ayush, Arka Darshan, Arka Kumkum, Arka Naveen, Pratap Glad-1, Punjab Elegance, Punjab Glad-2, Punjab Glance, Punjab Lemon Delight, Pusa Manmohak and Punjab Dawn) were tested in a Randomized Block Design (RBD) with three replications. Planting was done during the first week of December in both cropping seasons. Before planting, corms were treated with a fungicide solution containing both systemic and contact fungicide (e.g., Carbendazim + Mancozeb) @ of 2 gm per litre to ensure protection against fungal diseases. Corms were planted at a spacing of 30 cm between rows and 10 cm between plants within rows, at a depth of 5 cm, which accommodated approximately 30 plants per square meter. The RDF dose of 120 kg N, 150 Kg P, 150 Kg K per hectare was fulfilled by providing 21.12 Kg Urea, 75.00 Kg SSP and 20.4 Kg MOP for 800 m^2.

The entire experiment was conducted inside a naturally ventilated polyhouse. During the winter at night, the polyhouse sides were flipped down to retain and accumulate solar heat inside the structure, while in the morning, the sides were flipped up to allow ventilation and maintain optimal temperature throughout the day. This daily manual adjustment helped in maintaining favourable microclimatic conditions, protecting plants from cold stress and ensuring temperature stability conducive to growth and flowering under the mid-hill sub-temperate climate of Himachal Pradesh.

Standard intercultural practices such as irrigation, weeding, earthing-up and plant protection were uniformly applied across all treatments throughout the growing period. Spikes were harvested when the lowermost three florets showed visible coloration. Corms were lifted at physiological maturity in September each year. Yield data for spikes and corms were recorded at the time of their harvesting. The economic evaluation of corms was based on a uniform selling price of Rs. 3.0 per corm, reflecting prevailing market rates.

Meteorological parameters during the trial period were manually recorded on a daily basis using a digital temperature recorder installed inside the polyhouse to accurately monitor the internal microclimate conditions. The recorded data was used to correlate environmental factors with crop performance. Economic parameters calculated included gross return, net return and benefit-cost (B:C) ratio. Gross return combined income from spikes and corms which was calculated by multiplying number or spikes and corms yielded with their prevailing market prices which ranged from Rs 3.00 – 6.00 for each cut spike according to number of florets per cut spike [6-9 (₹3.00), 9-12 (₹4.00), 12-15 (₹5.00), ≥15 (₹6.00)] and corms (Rs 3.00 each corm). Net return was obtained by subtracting total cultivation costs from gross return and Benefit Cost Ratio was computed by dividing net returns from total cost of cultivation.

3. RESULTS AND DISCUSSION

3.1 Yield and Economic Performance

The data presented in Table 1 demonstrate considerable variation among the eleven gladiolus genotypes in terms of corm and spike production, as well as their resultant economic revenue per net cultivated area. Among the genotypes, Punjab Dawn displayed the highest production with 46,240.00 corms and spikes per net cultivated area achieving the maximum total revenue of ₹3,69,920.00.

These findings are consistent with earlier research conducted on different gladiolus cultivars, where genotypes exhibiting higher spike yields were associated with improved flower quality and better market prices (Harish et al., 2023; Safia et al., 2024). The higher price of ₹6.00 per cut spike of Pusa Manmohak and ₹5.00 per spike for Punjab Dawn supports that spike quality strongly influences economic feasibility which is in agreement with the earlier observations of Rashmi and Chandrashekar (2016) and Motla et al. (2022).

Table 1. Assessment of spike and corm production and economic revenue of different gladiolus genotypes for net cultivated area under polyhouse conditions

Genotypes/Treatments	Number of corms/Net Cultivated Area	Number of spikes/ Net Cultivated Area	Revenue from corms (₹ 3.00)	Market price /cut spike (₹)	Revenue from spikes (₹)	Total Revenue (₹)
Arka Ayush	36,040.00	36,040.00	1,08,120.00	5.00	1,80,200.00	2,88,320.00
Arka Darshan	36,720.00	36,720.00	1,10,160.00	5.00	1,83,600.00	2,93,760.00
Arka Kumkum	30,600.00	30,600.00	91,800.00	4.00	1,22,400.00	2,14,200.00
Arka Naveen	25,840.00	25,840.00	77,520.00	5.00	1,29,200.00	2,06,720.00
Pratap Glad -1	24,480.00	24,480.00	73,440.00	5.00	1,22,400.00	1,95,840.00
Punjab Elegance	29,920.00	29,920.00	89,760.00	5.00	1,49,600	2,39,360.00
Punjab Glad-2	32,640.00	32,640.00	97,920.00	4.00	1,30,560.00	2,28,480.00
Punjab Glance	24,480.00	24,480.00	73,440.00	4.00	97,920.00	1,71,360.00
Punjab Lemon Delight	29,920.00	29,920.00	89,760.00	3.00	89,760.00	179,520.00
Pusa Manmohak	33,320.00	33,320.00	99,960.00	6.00	1,99,920.00	2,99,880.00
Punjab Dawn	46,240.00	46,240.00	1,38,720.00	5.00	2,31,200.00	3,69,920.00

**Note: Net Cultivated Area = 680 m^2*

Punjab Lemon Delight (6.93) produced least number of florets per spike (<9) thus attaining market price of ₹ 3.00. whereas Punjab Glance (9.54), Punjab Glad-2 (10.97), Arka Kumkum (11.30), produced (9 to 12 florets), thus fetched a market price of ₹ 4.00. Most genotypes produced 12-15 florets, including Punjab Elegance (12.14), Arka Naveen (12.57), Punjab Dawn (12.9), Arka Darshan (13.14), Arka Ayush (13.37) and Pratap Glad-1 (14.47), reflecting good floret development. However, Pusa Manmohak, produced maximum number of florets (15.25) fetching highest market price of Rs 6.00.

Other genotypes such as Arka Darshan and Arka Ayush, Pusa Manmohak also showed substantial yields, with 36,720.00, 36,040.00 and 33,320.00 corms and spikes per net cultivated area respectively, leading to total revenues of ₹2,93,760, ₹2,88,320 and ₹2,99,880, supported by a uniform market price of ₹5.00 per cut spike for Arka Darshan and Arka Ayush and ₹6.00 for Pusa Manmohak. Comparable economic performance of cultivars with balanced spike density and market value has been reported in other gladiolus genotypes studied under both protected and open-field conditions (Avilala et al., 2020; Singh et al., 2014). On the other hand, genotypes like Punjab Lemon Delight and Punjab Glance showed least total revenues of ₹ 1,79,520 and ₹ 1,71,360 respectively as prior fetched only a market price of Rs 3.00 per cut spike due to poor spike quality with least number of florets (6.93) and latter recorded the lower corm and spike yields of 24,480.00, resulting in relatively lower revenues. This observation aligns with earlier findings indicating that lower spike yields significantly limits economic returns in gladiolus cultivation (Harish et al., 2023, Avilala et al., 2020).

In this study, revenue from corms was calculated at a constant rate of ₹3.00 per corm across all genotypes, while revenue from spikes varied depending on the market price per cut spike, ranging from ₹3.00 to ₹6.00. Cut spikes were graded according to number of florets; [6-9 (₹3), 9-12 (₹4), 12-15 (₹5), ≥15 (₹6)]. Improvements in flower quality and spike yield through agronomic practices such as integrated nutrient management and growth regulator application have also been documented across various gladiolus cultivars, further reinforcing that such interventions can enhance yield and market value (Motla et al., 2022; Nandania et al., 2023).

3.2 Cost of Cultivation

The detailed cost analysis presented in Table 2 highlights the significant financial inputs required for the successful cultivation of the crop under study. The largest share of the investment was allocated to the procurement of high-quality corms (₹61,200.00). Investment in land preparation, involving mechanized operations and the application of organic and chemical fertilizers (₹4,838.55), ensured that the crop received adequate nutrients, fostering optimal growth conditions. Labor-intensive activities such as planting and irrigation, Effective weed management through repeated weeding, earthing up and staking providing necessary support to plants, accounted for (₹ 3,675.00) of total cost and resulted in improved plant development and productivity. Proper harvesting and post-harvest processes, including cleaning, grading, packing (₹1,750.00) and transportation (₹25,500.00), played a key role in maintaining produce quality and facilitating smooth market access. Miscellaneous expenses such as polyhouse rent and plant protection measures for effective pest and disease management accounted for ₹37,000.00 of total costs. Overall, the total expenditure of ₹1,33,963.55 reflects a balanced distribution of costs across all phases of crop production, which aligns with standard practices for floricultural crops. This comprehensive cost framework provides valuable insights into the economic aspects of the cultivation system studied and serves as a basis for evaluating input efficiency, cost optimization and potential profitability, thereby guiding future research and practical applications in horticultural production.

3.3 Economic and Profit Performance

The economic assessment of different gladiolus genotypes under polyhouse conditions (Table 3) reveals substantial variation in profitability indicators such as gross return, net return and benefit-cost ratio. The consistent cost of cultivation was ₹ 1,33,963.55 per 800 m² across all genotypes. Among the tested genotypes, Punjab Dawn showed the highest gross return (₹3,69,920.00) and net return (₹2,35,957.00), with most significant and higher B:C ratio of 1.76, reflecting its outstanding yield and economic viability. These findings align with findings from previous studies on various gladiolus cultivars, where improved spike production and flower quality led to enhanced

economic returns (Harish et al., 2023; Safia et al., 2024, Tirkey et al., 2017).

Pusa Manmohak, Arka Darshan and Arka Ayush also demonstrated significant profits with net returns above 1.54 lakhs and significant B:C ratios greater than 1.00. Comparable economic potential linked to spike and corm production has been reported in other gladiolus cultivars by Avilala et al. (2020) and Singh SP et al. (2014). Conversely, genotypes such as Punjab Lemon Delight and Punjab Glance recorded lowest returns and benefit-cost ratios, which is consistent with observations of reduced profitability in lower-yielding carnation cultivars reported by Chahal et al. (2020) and in Dahlia Kumar et al. (2025) also signified the importance of selecting high yielding cultivars for earning high profits.

Table 2. Item-wise break-up of cost of cultivation of Gladiolus \ 800m^2 under polyhouse conditions

S. No.	Particulars	Units	Rates (₹)	Total Cost (₹)
(A)	**Field Preparation**			
1	Labour (bed preparation, watering etc.)	1 Labour	@ ₹ 350/ day / labour	350.00
2	Corm	20,400	@ 3.0 ₹ /corms	61,200.00
(B)	**Land Preparation**			
3	Ploughing by disc harrow	0.16 hr **(**10 min**)**	@ ₹ 800/hr.	128.00
4	Harrowing	0.16 hr	@ ₹ 600/hr.	96.00
5	Levelling with leveller	0.16 hr	@ ₹ 500/hr.	80.00
6a	FYM (Farmyard Manure)	2.0 ton	@ ₹ 100/q	2,000.00
6b	**Fertilizer (NPK)**			
	Urea	21.12 kg	@ ₹ 5.36/Kg	113.15
	SSP	75.00 kg	@ ₹ 12.6/Kg	945.00
	MOP	20.4 kg	@ ₹ 16/Kg	326.40
7	Layout & bed formation	-	@ ₹ 100/100 m²	800.00
(C)	**Planting and Irrigation**			
8	Labour for planting	3 Labour	@ ₹ 350/day	1,050.00
9	Irrigation (6 irrigations)	45 min each Time	@ ₹ 50/hr.	225.00
(D)	**Weed Management and Intercultural Operations**			
10	Weeding (2 times)	2 Labour	@ ₹ 350/day	700.00
11	Earthing up and hoeing	1 Labour	@ ₹ 350/day	350.00
12	Staking (Bamboo and nylon Thread)	-	-	1,000.00
	Staking (Labour)	1	@ ₹ 350/day	350.00
(E)	**Flower Harvesting & post-harvest**			
13	Harvesting	1 Labour	@ ₹ 350/day	350.00
14	Cleaning, grading, packing	2 Labour	@ ₹ 350/day	700.00
	Transportation charges	102 boxes	@ ₹ 250/box	25,500.00
(F)	**Corm Harvesting & post-harvest**			
15	Harvesting of corms	1 Labour	@ ₹ 350/day	350.00
16	Cleaning, grading, packing	1 Labour	@ ₹ 350/day	350.00
(J)	**Miscellaneous**			
17	Polyhouse Rent (for 9 months)	-	@ ₹ 4,000/month	36,000.00
18	Plant Protection, Micronutrients, Sprays	Lump sum	-	1,000.00
TOTAL				₹ 1,33,963.55

Note:

- *1 labour (worker) = 8 hours of work: This is considered 1 working day in agricultural standards.*
- *8 hours = 1 day: A full workday for a laborer.*
- *1 box = 25 bunches: A unit of harvest packaging.*
- *1 bunch = 10 cut spikes: A bunch is a smaller sub-unit of harvested spikes.*
- *The total area is 800 square meters, of which 15% has been designated for bunds and footpaths. Therefore, the net cultivated area is 680 square meters.*

Table 3. Economic performance of gladiolus genotypes under polyhouse conditions

Genotypes	Cost of Cultivation (₹/800 m^2)	Gross Return (₹/ 800 m^2)	Net Return (₹/800 m^2)	B:C Ratio
Arka Ayush	1,33,963.00	2,88,320.00	1,54,357.00	1.15
Arka Darshan	1,33,963.00	2,93,760.00	1,59,797.00	1.19
Arka Kumkum	1,33,963.00	2,14,200.00	80,237.00	0.59
Arka Naveen	1,33,963.00	2,06,720.00	72,757.00	0.54
Pratap Glad -1	1,33,963.00	1,95,840.00	61,877.00	0.46
Punjab Elegance	1,33,963.00	2,39,360.00	1,05,397.00	0.78
Punjab Glad-2	1,33,963.00	2,28,480.00	94,517.00	0.70
Punjab Glance	1,33,963.00	1,71,360.00	37,397.00	0.28
Punjab Lemon Delight	1,33,963.00	2,09,440.00	45,557.00	0.34
Pusa Manmohak	1,33,963.00	2,99,880.00	1,65,917.00	1.24
Punjab Dawn	1,33,963.00	3,69,920.00	2,35,957.00	1.76

Table 4. Abbreviation and Full Form

Abbreviation / Term	Full Form / Explanation
B:C Ratio	Benefit-Cost Ratio – Ratio of Net Return to Cost of Cultivation
Net Return	Gross Return minus Cost of Cultivation
Gross Return	Total Revenue from both corms and spikes
Cost of Cultivation	Total expenditure for gladiolus cultivation (per 800 m^2 in this study)
FYM	Farmyard Manure
SSP	Single Super Phosphate (a phosphorus fertilizer)
MOP	Muriate of Potash (a potassium fertilizer)
NPK	Nitrogen (N), Phosphorus (P) and Potassium (K)
m^2	Square meter – unit of area used for measuring cultivation area
Cm	Centimetre
@	"At the rate of" – used for specifying unit cost
RBD	Randomized Block Design – a statistical design for field experiments
₹	Indian Rupee – currency used for cost and revenue calculations
Spike	The floral stalk harvested from gladiolus plants
Corm	Underground storage organ of gladiolus, used for propagation and sale
Polyhouse	A type of greenhouse with polyethylene covering, used for protected cultivation
Labour	Workers involved in cultivation activities
Box	A packaging unit used for transporting bunches of spikes
Bunch	A group of 10 gladiolus spikes
APEDA	Agricultural and Processed Food Products Export Development Authority
FAO	Food and Agriculture Organization
ANOVA	Analysis of Variance
Hr	Hour

Agronomic practices including integrated nutrient management and growth regulator application have been demonstrated to enhance spike and corm yield across various gladiolus cultivars, thereby increasing economic returns (Motla et al., 2022; Nandania et al., 2023). These results signify the importance of cultivar selection combined with improved crop management to maximize profitability in gladiolus cultivation.

4. CONCLUSION

This study provides a comprehensive economic evaluation of eleven gladiolus genotypes under protected conditions, highlighting significant variation in yield, revenue and profitability. Punjab Dawn exhibited superior agronomic performance in terms of yield and economic returns, making it the most suitable cultivar for protected cultivation. The detailed cost-benefit analysis presented here equips floriculturists with crucial insights for optimal cultivar selection and resource allocation. These findings support policymakers and stakeholders in strategizing sustainable growth of the floriculture sector in India, addressing market demands, and adapting to climatic challenges.

Overall, this work advances knowledge necessary for boosting profitability and sustainability in gladiolus production systems.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Artificial intelligence (AI) tools, especially Perplexity AI, were used in preparing this manuscript to improve grammar, structure, and clarity while ensuring effective and professional communication of the research without altering its scientific content.

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to Dr. Yashwant Singh Parmar University of Horticulture and Forestry, Nauni, Solan (HP), for providing the necessary facilities to carry out this work. My heartfelt thanks go to my respected teachers, for their constant guidance, support and encouragement throughout the course of this study.

COMPETING INTERESTS

Authors have declared that they have no known competing financial interests or non-financial interests or personal relationships that could have appeared to influence the work reported in this paper.

REFERENCES

Agricultural and Processed Food Products Export Development Authority (APEDA). (2023). *Floriculture Export Data & Trends Report*. Retrieved from https://apeda.gov.in/apedawebsite/ (Accessed: 2 August 2025).

Aswath, C., Bose, T. K., Bhatia, R., Saha, T. N., Kumar, R., & Dutta, K. (2021). *Commercial flowers*. Daya Publishing House.

Avilala, D. P., Lakshmi, K. S., Nagaraju, R., & Reddy, D. D. (2020). Economics of different *Gladiolus* cultivars grown under open field conditions in Southern zone of Andhra Pradesh. *Plant Archives*, 20(1).

Bala, B. (2021). Economic analysis of carnation cultivation under polyhouse conditions in Bilaspur district of Himachal Pradesh. *Indian Journal of Ecology*, 48(2), 577–582.

Bolagam, A., & Natarajan, S. (2019). Economics of cut *gladiolus* (*Gladiolus grandiflorus* L.) production with application of bio stimulants. *Journal of Applied and Natural Science*, 11(3), 693–699.

Chahal, A. S., Sharma, R., & Dev, K. (2020). Economic analysis of carnation under protective cultivation: A study of Mid Hills Zone of Himachal Pradesh. *Indian Journal of Ecology*, 47(2), 369–377.

Dasondhi, P. C. (2006). *Evaluation of different cultivars of gladiolus (Gladiolus hybridus Hort.) under agroclimatic condition of Southern Rajasthan* (MSc Thesis). Maharana Pratap University of Agriculture and Technology, Udaipur.

Food and Agriculture Organization (FAO). (2023). *Global cut flower production statistics*. Retrieved from http://www.fao.org/faostat/en/#data/QCL (Accessed: 2 August 2025).

Gao, L., Kantar, M. B., Moxley, D., Ortiz-Barrientos, D., & Rieseberg, L. H. (2023). Crop adaptation to climate change: An evolutionary perspective. *Molecular Plant*, 16(10), 1518–1546.

Harish, B. K., Pandey, R. K., Shah, A. H., Laishram, N., Singh, A., & Dogra, S. (2023). Corm yield and economics of *gladiolus* cultivars affected by micronutrients grown under open field conditions in subtropics of Jammu. *International Journal of Environment and Climate Change*, 13(7), 24–31.

Kumar, M., Thakur, P., Kashyap, B., Sharma, A., Kumar, P., Bhardwaj, R., Kaushal, N., Shah, A. H., & Sahu, P. K. (2025). The economics of *Dahlia* (*Dahlia variabilis* L.) cultivation in the low hill conditions of Himachal Pradesh. *Agriculture Association of Textile Chemical and Critical Reviews Journal*, 13(1), 204–211.

Kumar, V. (2020). *Evaluation of gladiolus (Gladiolus hybridus Hort.) varieties under Bundelkhand region of Uttar Pradesh* (MSc Thesis). Banda University of Agriculture and Technology, Banda.

Motla, R., Malik, S., Gangwar, V., Kumar, D., Kumar, A., Pratap, A., & Shukla, U. (2022). Integrated effect of bio-fertilizers, organic and inorganic fertilizers on flowering and quality attributes of *gladiolus* (*Gladiolus grandiflorus* L.) cv. Nova Lux. *International Journal of Plant & Soil Science*, 34(22), 864–870.

Nandania, M., Wankhade, V., & Bhadaraka, J. (2023). Economic analysis on *gladiolus* (*Gladiolus grandiflorus* L.) as affected by soaking with plant growth regulators on growth, yield, and quality. *International Journal of Statistics and Applied Mathematics*, 8(6), 1270–1273.

Rashmi, R., & Chandrashekar, S. Y. (2016). Economic feasibility and profitability of *gladiolus* (*Gladiolus hybridus* L.) cultivation under open field condition. *Journal of Plant Development Sciences*, 8(7), 355–358.

Safia, A., Thomas, K. P., & Bindu, R. (2024). Varietal assessment of *gladiolus* (*Gladiolus* spp.) for growth, flowering characteristics, yield, and economics under highland agroclimatic conditions of Wayanad, Kerala, India. *Journal of Experimental Agriculture International*, 46(4), 1–11.

Sarkar, I., Biswas, A., & Bhattacharjee, B. (2014). Evaluation of *gladiolus* cultivars with respect to flowering attributes in Darjeeling Hills of West Bengal, India. *Indian Journal of Agricultural Research*, 48(2), 126–130.

Singh, K. P., Gaganana, T. M., & Subramanayam, K. V. (2011). Effect of planting densities on yield and economics of *gladiolus* cultivation. *Annals of Horticulture*, 4(1), 104–105.

Singh, N., Rana, T. S., Datta, S. K., Cardarelli, M., & Dobránszki, J. (2024). Biotechnology advances in *gladiolus*: A review. *The Journal of Horticultural Science and Biotechnology*, 100(3), 314–328.

Singh, S. P., Kumar, N., Rizvi, S. E. H., & Sharma, P. K. (2014). An economic analysis of *gladiolus* cultivation in Jammu district of J&K state. *Economic Affairs*, 59(4), 515–520.

Tirkey, P., Kullur, L. R., & Prasad, V. M. (2017). Effect of organic and inorganic source of NPK on growth and yield parameters of *gladiolus* (*Gladiolus grandiflorus* L.) cv. Jester. *Journal of Pharmacognosy and Phytochemistry*, 6(5), 1004–1006.

Uhlmann, L. O., Becker, C. C., Tomiozzo, R., Streck, N. A., Schons, A., Balest, D. S., Braga, M. D. S., Schwab, N. T., & Langner, J. A. (2019). *Gladiolus* as an alternative for diversification and profit in small rural property. *Ornamental Horticulture*, 25(2), 200–208.

Peer-review history:
The peer review history for this paper can be accessed here:
https://pr.sdiarticle5.com/review-history/144143