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# Effect of storage media on gladiolus corms var. Psittacinus Hybrid

**Rinkal Dudhat, Sudha Patil, Tejal Patel and RA Gurjar**

## Abstract
The objective of present investigation was to study the effect of different media of storage on gladiolus corms. The whole experiment was arranged with completely randomized design including 12 treatments *viz.*, cold storage (control), cocopeat (100%), sawdust (100%), sand (100%), rice husk (100%), cocopeat + sawdust (50:50), cocopeat + sand (50:50), cocopeat + rice husk (50:50), sawdust + sand (50:50), sawdust + rice husk (50:50), sand + rice husk (50:50) and untreated (absolute control). Various corm parameters of gladiolus were measured before storage to calculate parameters after storage period. Amongst all the treatments, corms stored in cocopeat ($T_2$) exhibited maximum weight of corm (5.60 g), minimum physiological loss of weight (0.65 g), maximum corm diameter (2.70 cm) and minimum reduction in diameter (0.10 cm). Significantly lowest rotting percentage (12.84%) was observed in corms stored in cold storage ($T_1$) however, none of the treatments recorded sprouting of corms during storage. Among different treatments of storage media, cocopeat exerted significant impact on physiological loss of weight and diameter reduction while stored in cold storage influenced rotting losses. Therefore, it can be concluded from the present study that use of storage media can increase BCR by reducing the requirement and expenses of cold storage.

**Keywords:** Gladiolus, corm, storage, media

## Introduction
India has an extensive tradition of floriculture where references to flowers and gardens are originating in ancient Sanskrit classics like Ramayana and Mahabharata. With changing life style and increased urban affluence, floriculture has assumed a positive commercial status presently and it has emerged as an imperative agri-business venture. Among cut flowers, gladiolus is acquisitioning position as queen of bulbous flowers in international trades. Gladiolus is a genus of bulbous flowering plants belongs to the family Iridaceae which is circulated in Mediterranean Europe, Asia, Tropical Africa and South Africa. Gladiolus var. Psittacinus Hybrid attains wide range of height from 65 cm to 125 cm, is late flowering cultivar that takes 80 - 100 days from planting to flowering, self-sterile and highly prolific. The mean spike length is 65-70 cm with 11-14 florets. The florets are whole orange with yellow coloured throat. Moreover, corm size of this variety is small and overall it is thermo insensitive as well as hardy variety (Poon *et al*., 2009) [9].

The propagating material of gladiolus is named as "corm" which is a food-storing underground stem. Gladiolus corms start sprouting as soon as their dormancy gets over but due to unfavourable conditions, they start to die and so cannot be kept without storage. The perishability and postharvest losses of corms during storage are the major constraints in the commercial cultivation of gladiolus crop. There is a great scope for increasing cultivation of gladiolus in Gujarat, as the soil and climatic conditions of these regions are favourable but the most common problem in gladiolus is storage of corms during dormancy period which is approximately six months. Gladiolus corms stored in cold storage at 4-5 °C is followed but this method increases the cost of cultivation, so small farmers cannot afford this method. Because of these reasons, several simple, low-cost traditional methods are being followed by different parts of the world to store different root and tuber crops in the fresh state (Ravi *et al*., 1996) [11]. For that some media used such as paddy straw, dried grass, rice husk, cocopeat, coir fibre, sawdust, river sand, wood ash, peat moss, vermiculite, newspapers, dry sugar cane leaves, raffia palm leaves, leaves of *Stychnos nux-vomica* (Kanjiram), *etc*. Out of them, cocopeat, sawdust, sand and rice husk were selected as storage media for this study. Limited research work has been done on different methods and media of storage of gladiolus corms and this research would be helpful for the farmers who cannot store gladiolus corms properly

or cannot afford cost of cold storage.

## Materials and Methods

The experiment was conducted at Laboratory, Department of Floriculture and Landscape Architecture, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari, Gujarat during 2018-19. The experiment was planned with twelve treatments *viz.*, $T_1$ : Cold storage @ 6 °C (Control), $T_2$: Cocopeat (100%), $T_3$: Sawdust (100%), $T_4$: Sand (100%), $T_5$: Rice husk (100%), $T_6$: Cocopeat + Sawdust (50:50), $T_7$: Cocopeat + Sand (50:50), $T_8$: Cocopeat + Rice husk (50:50), $T_9$: Sawdust + Sand (50:50), $T_{10}$: Sawdust + Rice husk (50:50), $T_{11}$: Sand + Rice husk (50:50) and $T_{12}$: Untreated (Absolute Control) in Completely Randomized Design (CRD) with four repetitions. Properties of media are presented in Table 1. Equal sized corms of gladiolus var. Psittacinus Hybrid were obtained from the Floriculture Research Farm, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari. Corms lifted from field were cured for 15-20 days in shade. Corms treated with carbendazim @ 20 g/ 10 lit for 15 minutes. Then corms were spread on floor in shady area for 2-3 days to dry. After that corms were treated with carbendazim powder and stored in different media in third week of May. Weight and diameter of corms were recorded before stored in various media in plastic crates of 10 kg capacity. First layer of media (4 cm) was spread according to treatments and on that corms were arranged in form of layer. Corms were covered with layer of media again and kept under ambient condition. Corms were kept in bag of net and stored in cold storage at 6 °C as control while corms without any meadi were placed in plastic crate and kept at ambient condition as absolute control. Corms were removed from storage media and cold storage in first week of October and various parameters were recorded to study the chage in quality of corms. The data was analysed using standard procedure of statistical analysis of variance appropriate to the Completely Randomized Design as described by Panse and Sukhatme (1985) [8].

**Table 1:** Chemical properties of media

| Sr. No. | Media | EC (ds/m$^2$) | pH |
|---|---|---|---|
| 1 | Cocopeat | 7.90 | 6.0 |
| 2 | Sawdust | 0.46 | 5.3 |
| 3 | Sand | 0.18 | 7.4 |
| 4 | Rice husk | 0.64 | 5.8 |

## Results and Discussion

### Before storage

The data given in Table 2 showed non-significant differences for weight and diameter of gladiolus corms var. Psittacinus Hybrid before storage in media. Non-significant results obtained because corms of uniform size were procured to kept in different treatments and similar observations on weight and diameter of corms were further used to calculate physiological weight loss as well as diameter reduction of corms.

**Table 2:** Weight and diameter of gladiolus corms recorded before storage

| Treatments | Before storage | |
|---|---|---|
| | Weight of corms (g) | Diameter of corms (cm) |
| $T_1$- Cold storage (control) | 6.55 | 2.76 |
| $T_2$- Cocopeat (100%) | 6.25 | 2.80 |
| $T_3$- Sawdust (100%) | 6.53 | 2.78 |
| $T_4$- Sand (100%) | 6.53 | 2.76 |
| $T_5$- Rice husk (100%) | 6.43 | 2.79 |
| $T_6$- Cocopeat + Sawdust (50:50) | 6.45 | 2.80 |
| $T_7$- Cocopeat + Sand (50:50) | 6.35 | 2.76 |
| $T_8$- Cocopeat + Rice husk (50:50) | 6.58 | 2.76 |
| $T_9$- Sawdust + Sand (50:50) | 6.38 | 2.78 |
| $T_{10}$- Sawdust + Rice husk (50:50) | 6.80 | 2.77 |
| $T_{11}$- Sand + Rice husk (50:50) | 6.90 | 2.77 |
| $T_{12}$- Untreated (absolute control) | 6.85 | 2.79 |
| S.Em.± | 0.16 | 0.07 |
| C.D. at 5% | NS | NS |
| C.V.% | 4.95 | 4.92 |

### After storage

The data showed significant variation for weight of corms and physiological loss on weight after storage (Table 3). Maximum weight of corm (5.60 g) with minimum physiological loss of weight (0.65 g) was recorded in corms stored in cocopeat media ($T_2$). According to Lauritzen (1934) [6], amount of air movement plays a part in modifying loss in weight. In the same way, the loss in weight of gladiolus corms during storage was might be due to loss of water through evaporation and loss of carbon dioxide through respiration. Cocopeat is very uniform media with great porosity and hence, it may increase aeration which helped to control temperature in media during storage that retained the weight with minimum physiological loss in weight of corms. Similar findings have been reported by Maalekuu *et al*. (2014) [7] about weight loss in white yam corm and stated that the respiration, transpiration and sprouting are the main factors responsible for weight loss. There is a positive correlation of weight with loss of water or moisture from the produce due to transpiration. Moreover, the probable reason for significant minimum physiological weight loss in cocopeat due to relation of maximum retention of weight of corms which stored in cocopeat media. Whereas, treatments $T_{12}$ (untreated corms) exhibited minimum weight of corms (4.63 g) and maximum physiological loss of weight (2.23 g). Retention of weight has direct correlation with physiological loss of weight

hence, higher loss in weight of corm resulted into minimum weight of corms which were placed without media (control) therefore couldn't control temperature, aeration and humidity during storage period. More weight loss usually occurs as a result of more respiration during storage of corms so more moisture loss occured which can be facilitated by high temperatures and this has direct impact on the quality of the stored produce (Ezeocha and Ironkwe, 2017) [4].

**Table 3:** Effect of storage media on different characters of gladiolus corms

| Treatments | After Storage | | | | |
|---|---|---|---|---|---|
| | Weight of corms (g) | Physiological loss of weight (g) | Diameter of corms (cm) | Reduction in diameter (cm) | Rotting percentage* |
| $T_1$- Cold storage (control) | 5.33 | 1.23 | 2.59 | 0.16 | 12.84 (5.00) |
| $T_2$- Cocopeat (100%) | 5.60 | 0.65 | 2.70 | 0.10 | 14.84 (6.67) |
| $T_3$- Sawdust (100%) | 5.40 | 1.13 | 2.65 | 0.13 | 15.29 (7.00) |
| $T_4$- Sand (100%) | 5.33 | 1.20 | 2.62 | 0.15 | 15.69 (7.33) |
| $T_5$- Rice husk (100%) | 4.63 | 1.80 | 2.54 | 0.25 | 17.76 (9.33) |
| $T_6$- Cocopeat + Sawdust (50:50) | 5.50 | 0.95 | 2.66 | 0.13 | 14.92 (6.67) |
| $T_7$- Cocopeat + Sand (50:50) | 5.18 | 1.18 | 2.59 | 0.18 | 15.69 (7.33) |
| $T_8$- Cocopeat + Rice husk (50:50) | 5.25 | 1.33 | 2.55 | 0.21 | 16.40 (8.00) |
| $T_9$- Sawdust + Sand (50:50) | 4.88 | 1.50 | 2.59 | 0.20 | 16.03 (7.67) |
| $T_{10}$- Sawdust + Rice husk (50:50) | 5.18 | 1.63 | 2.55 | 0.22 | 16.76 (8.33) |
| $T_{11}$- Sand + Rice husk (50:50) | 5.10 | 1.80 | 2.54 | 0.23 | 17.76 (9.33) |
| $T_{12}$- Untreated (absolute control) | 4.63 | 2.23 | 2.54 | 0.25 | 18.10 (9.67) |
| S.Em.± | 0.15 | 0.06 | 0.07 | 0.004 | 0.64 |
| C.D. at 5% | 0.42 | 0.16 | NS | 0.012 | 1.83 |
| C.V.% | 5.62 | 8.22 | 5.34 | 4.60 | 7.97 |

*Values out of parenthesis are arc sine transformed values

Non-significant variation for diameter of corms was observed but maximum diameter of corm (2.70 cm) with minimum reduction in diameter (0.10 cm) was recorded by corms stored in cocopeat media ($T_2$). This might be due to the fact that weight loss is positively correlated with diameter of corm. Moreover, the credible cause for significantly minimum reduction in diameter of corms in cocopeat is due to maximum retention of diameter of corms stored in same media. Similar kind of results were noted by Rindels (1996) [12] for different flower bulbs and Bogevska *et al*. (2014) [2] in sweet onion. Whereas, treatments $T_{12}$ (untreated corms) exhibited minimum diameter of corms (2.54 cm) that showed maximum reduction in diameter of corm (0.25 cm). As of that definite media treatment controlled temperature and humidity by providing proper aeration and creating suitable microclimate for corms than untreated treatment that has no control over the environmental effect. When temperature increased, loss of moisture from corms in form of respiration and transpiration might be increased which resulted into shrinkage of corms.

The rotting percentage was significantly affected by various media treatments during storage and lowest rotting was observed in corms placed in cold storage ($T_1$). These results are in conformity with findings of Lauritzen (1934) [6] who recorded minimum rotting of gladiolus corms stored in cold storage and stated that rotting percentage increase with fluctuation in temperature and humidity at ambient condition. In the same way, Kaur *et al*. (2018) [5] reported minimum spoilage of colocasia corms in cold storage. However, treatments $T_{12}$ (untreated corms) and $T_5$ (rice husk) recorded highest rotting percentage. Venugopal *et al*. (2017) [13] stated that death or decay of plant tissue accompanied by dark brown discoloration, softening and disintegration of tissue as a result of bacterial infection was also considered as rotting. Similar results were observed by Ezeocha and Ironkwe (2017) [4] in livingstone potato where they recorded highest rotting percentage in potato covered with rice husk and stored in pit. Ramachandrudu and Thangam (2009) [10] observed minimum spoilage in gladiolus corms that stored in 5 cm sand. In the same way, William (2010) [14] recorded reduction in decay of corms, tubers, bulbs and rhizomes of various flower crops when stored in peat as compared to open storage. Booth (1975) [3] also specified that rice husk has not proved to be a very suitable packing material because it is generating heat, difficult to wet the husks and moisture distribution is uneven. Maalekuu *et al*. (2014) [7] reported more rotting due to poor air circulation within the covered yam aid in the build-up of heat and increase humidity as a result of respiration. Hence, induces bacterial spore germination and growth of pathogen. Moreover, Ansary *et al*. (2015) [1] stated that higher rotting might be due to favourable condition of fungal growth in higher relative humidity in the atmosphere coupled with high temperature.

No sprouting was observed in corms of gladiolus var. Psittacinus Hybrid during storage period in any of the treatments. Similar results were obtained by Lauritzen (1934) [6] in different gladiolus varieties and reported that some varieties didn't show sprouting during storage at different temperature which might be due to differences in dormancy level of a particular variety. Poon *et al*. (2009) [9] also reported that this variety has small corms and it is somewhat hardy.

1. Clean corms

2. Corms treated with carbendazim

3. Net placed in bottom of crates

4. Spreading of 1st layer of media

5. Arranged corms on media

6. Applied 2nd layer of media

7. Then cover with net

8. Stored at ambient condition

Methodology of corms storage in different media

**Conclusion**

On the basis of present investigation, it can be concluded that cocopeat exerted significant impact on physiological loss of weight and diameter reduction while stored in cold storage influenced rotting losses of gladiolus corm, thereby suggesting their use as storage media can increase BCR by reducing the requirement and expenses of cold storage.

**References**


1. Ansary SH, Mudi N, Chowdhury AK, Gayen N, Barul K. Comparative studies of different pre harvest practices and economic analysis of different low cost storage structures for reduction of storage losses of onion (*Allium cepa* L.) in West Bengal condition. Int. J Tropical Agri. 2015;33(2):333-337.
2. Bogevska Z, Agic R, Popsimonova G, Davitkovska M, Iljovski I. Physiological loss during storage of sweet onion in Republic of Macedonia. Agric. & Fore. 2014;60(4):149-154.
3. Booth RH. Cassava storage: postharvest deterioration and storage of fresh cassava roots. Centro International de Agriculture Tropical Cali – Colombia. Series EE 16, 1975, p.1-18.
4. Ezeocha CV, Ironkwe AG. Effect of storage methods and period on the physiological and nutrient components of livingstone potato (*Plectranthus esculentus*) in Abia State, Nigeria. Open Agri. 2017;2:213-219.
5. Kaur R, Sepat S, Jaidka M. Advanced in Vegetable Agronomy, Director of Indian Agricultural Research Institute New Delhi, ICAR and Department of Agricultural Research and Education, Ministry of Agriculture, Government of India, India; c2018. p. 202-205.
6. Lauritzen JI. Factors ffecting gladiolus in storage. J Agril. Res. 1934;48(3):265-282.
7. Maalekuu BK, Saajah JK, Addae AK. Effect of three storage methods on the quality and shelf-life of white yam (*Dioscorea rotundata* L.) cultivars Pona and Tela. J Agril. Sci. 2014;6(7):221-230.
8. Panse VG, Sukhatme PV. Statistical methods for aricultural workers. Indian Council of Agril. Res., New Delhi; c1985. p.152-161.
9. Poon TB, Rao TM, Kumar DP, Venugopalan R, Dhananjaya MV. Study on floral biology of gladiolus genotype. Nepal J Sci. & Tech. 2009;10:37-43.
10. Ramachandrudu K, Thangam M. Production technology of gladiolus in Goa. Director - ICAR Research Complex for Goa, India. Technical Bulletin No. 20. 2009, p. 24-26.
11. Ravi V, Aked J, Balagopalan C. Review on tropical root and tuber crops - I. Storage Methods and Quality Changes. Critical Rev. Food Sci. & Nutrition. 1996;36(7):661-709.
12. Rindels S. Fall storage of tender bulbs, corms and tubers [Online]. Iowa State University, 1996. https://hortnews. extension.iastate.edu/9-13-1996/cormtuber.html.
13. Venugopal AP, Viswanath A, Ganapathy S. Development of night time on-farm ventilated potato storage sytem in Nilgiri Hills of Southern India. Internat. J Proc. & Post Harvest Technol. 2017;8(1):37-43.
14. Kies MS, Holsinger FC, Lee JJ, William Jr WN, Glisson BS, Lin HY, *et al.* Induction chemotherapy and cetuximab for locally advanced squamous cell carcinoma of the head and neck: results from a phase II prospective trial. Journal of Clinical Oncology. 2010 Jan 1;28(1):8.