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## **STUDIES ON THE PERFORMANCE OF SOME EXOTIC GLADIOLUS CULTIVARS UNDER RAIN-FED CONDITIONS**

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### **ABSTRACT**

Gladiolus is a popular cut flower, both with the consumer and the florist alike because of its many spike forms, colors and color combinations. Four exotic cultivars of *Gladiolus alatus* viz., Madriver, Fado, Florared and Pietmohlen were evaluated for their performance under Rainfed conditions in the experimental area of the Department of Horticulture, Pir Mehr Ali Shah Arid Agriculture University Rawalpindi. Results showed that all gladiolus cultivars had significant effect on vegetative and floral characters. Among these cultivars Pietmohlen was promising for leaf length (cm), leaf area (cm<sup>2</sup>), days taken to start blooming, number of florets per plant and florets length. Florared showed superiority for number of leaves per plants and vase life. Pietmohlen and Florared performed better than Fado and Madriver in regards to vegetative and floral characteristics. Hence these two cultivars are recommended for general cultivation under conditions.

**Keywords:** Vase life, *Gladiolus alatus*, evaluation, adaptability, number of florets per plant.

### **Introduction**

Commercial production of ornamental floras is a worldwide business. Often under estimated, ornamental plant production even exceeds fruit and vegetable production in many countries of the world (Alam *et al.*, 2013). The group of ornamental plants is very large, covering hundreds of different species from various taxonomic groups. Bulbous plants are frequently used as ornamental plants (Shaukat *et al.*, 2013). The subterranean organs of these plants supply moisture, nutrients and other essential for plant survival. Adaptation to harsh environments makes bulbous plants invaluable in a garden setting. They can be planted under shrubs or between perennials in the flower border or can be adopted informally in lawns and orchards, or formally in seasonal bedding display (Patil, 2003). For splashes of color all around the garden, bulbous plants can also be planted in pots.

Bulbous plants ring the seasonal variations throughout the year with glorious flower display. Though the bulbous crops have potential for cultivation but only a few bulbous crops like *Tuberose*, *Heliconia*, *Alstromeria* and *Gladiolus* are commercially exploited (Alam *et al.*, 2013).

Gladiolus is a popular bulbous cut flower, has great demand in both domestic (Pakistani) as well as international markets. It is known as queen of the bulbous plants, which is valued for its good-looking flower spikes (Chanda *et al.*, 2000; Riaz *et al.*, 2007). Its magnificent inflorescence with variety of colors, made it gorgeous for use in herbaceous borders, beddings, rockeries, pots and for cut flowers (Abbasi *et al.*, 2005). They are widely used as artistic garlands, floral ornaments, bouquets and religious ceremonies (Islam *et al.*, 2011). The long flower spikes are outstanding as

cut flower for table decoration when arranged in vases (Islam and Haque, 2011; Memon *et al.*, 2012; Nasir, 2012). The major producing countries are the United States (Florida and California), Holland, Italy, France, Poland, Bulgaria, Brazil, India, Australia and Israel. In the United States, the best selling bulb is the gladiolus with an predictable annual sale of more than 370 million corms (Narain, 2004). Consumption of gladiolus is going to increase day by day in Pakistan. It is related with the rising living standards, education and electronic media that have encouraged this business in recent years (Riaz *et al.*, 2007).

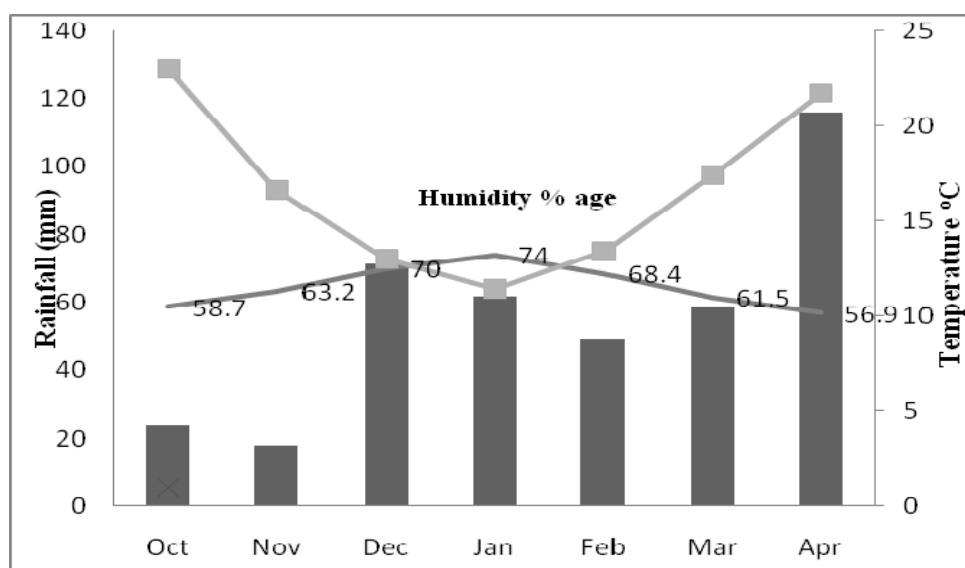
Genetic makeup and environment are the features which depict the performance of a variety by affecting all important traits (Khan *et al.*, 2001). Response of different varieties varies under different agro-ecological conditions and several varieties of the same species behave different even grown under same environment (Mushtaq *et al.*, 2013). The suitable agro-climatic conditions of the country clearly indicate that climatic conditions of Pakistan allow gladiolus cultivation throughout the year in various parts (Ahmad *et al.*, 2008). Keeping in view the importance of gladiolus, exotic cultivars were evaluated under rain-fed conditions for their performance to boost up flower industry in Pakistan.

### Materials and Methods

The present study on *Gladiolus alatus* was conducted in the experimental area of the Department of Horticulture, Pir Mehr Ali Shah Arid Agriculture University Rawalpindi during the year 2008-09. Four exotic cultivars of gladiolus namely, Madrider, Fado, Florared and Pietmohlen were used in the experiment. The experiment was laid out according to Randomized Complete Block

Design (RCBD) with three replications. The land was brought to a fine tilth by ploughing. A spacing of 150 cm between two replications was provided for laying out irrigation channels and working space. The corms of four exotic cultivars of gladiolus were taken and prepared by removing the dried husk present on them. These corms were then planted along the sides of the ridges at a depth of 5 cm. There were twelve plots; three plots were randomly allocated to each cultivar. Light irrigation was given immediately after planting.

Well decomposed farm yard manure at the rate of 5 kg/sq.m was applied at the time of land preparation. Recommended dose of NPK (30:20:20 g/m<sup>2</sup>) was applied in the form of Urea, Single Super Phosphate and Muriate of Potash respectively. At the time of planting half the dose of N, full dose of P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O were applied. The experimental site was kept free of weed by periodic hand weeding. Protective irrigations were given as and when required, during crop growth period. Twenty days prior to lifting of the corms irrigation was withheld. The spikes were harvested at first floret loosening stage (opening stage) and used for recording different parameters. The corms and cormels were lifted from the ground when the foliage turned to yellow color. Data was collected on number of leaves per plant, leaf length (cm), leaf area (cm<sup>2</sup>), plant height (cm), spike length (cm), days taken to start blooming, number of florets per plant, floret size (cm) and vase life. The experiments were subjected to analysis of variance technique (ANOVA). Least Significant Difference test (LSD) at 5% probability level was used to compare the means (Steel *et al.*, 1997). Monthly meteorological data is given in Fig. 1.



**Fig.1. Monthly meteorological data during the crop season 2008-2009.**

### Results

Gladiolus is rich in varietal possessions and every year there is an addition of new varieties (Zubair *et al.*, 2013). Four cultivars Pietmohlen, Madraver, Florared and Fado were grown under the same soil and climatic conditions. Vegetative and floral characteristics were noted for these cultivars. Genetic makeup and environment are the key factors which play important role in the performance of a variety (Mushtaq *et al.*, 2013). Analysis of the data showed that number of leaves per plant, leaf length (cm), and leaf area (cm<sup>2</sup>) were significantly different for different gladiolus cultivars (Fig. 2 & 4). Among different cultivars, Florared showed the highest number of leaves per plant (7.50) against the minimum in Pietmohlen (6.50). Different gladiolus cultivars were statistically different for leaf length. Madraver produced maximum leaf length (52.92 cm) which was statistically at par with Pietmohlen and Fado while Florared had minimum leaf length (47.00 cm). Pietmohlen showed maximum leaf area (150 cm<sup>2</sup>) while Madraver and Fado had statistically same leaf area. Minimum leaf area (90 cm<sup>2</sup>) was observed in Florared. Statistical analysis of the data showed that plant height was non-significant for all the cultivars under study. Although maximum plant height was observed in Fado (140.3 cm) and minimum in Florared (100 cm). The

genotype did not showed significant variation for spike length.

Analysis of the data showed that days taken to start blooming of different gladiolus cultivars were differed significantly (Fig. 3). Maximum number of days taken for initiation of first blooming (143.7) was recorded in Pietmohlen which was statistically at par with Fado while minimum number of days (131.1) Madraver. Number of florets per plant was statistically significantly different (Fig. 5). Maximum numbers of florets per plant (16.50) were recorded in Pietmohlen and Fado which was statistically similar with florared. Minimum number of florets per plant (12.50) were recorded in Madraver.

Florets width of all the cultivars did not showed significant difference. However, Fado showed maximum florets width (11.50) and Madraver showed minimum (11.08) (Fig. 5). Gladiolus cultivars showed significant difference for floret length (Fig. 5). Pietmohlen and Fado showed maximum floret length (8.08 cm) while Madraver showed minimum floret length (7.42 cm) (Fig. 5). Gladiolus cultivars showed significant difference for Vase life (Floret life). Maximum floret life time (5.08) was recorded in Florared against the minimum (3.92) in Pietmohlen (Fig. 5).

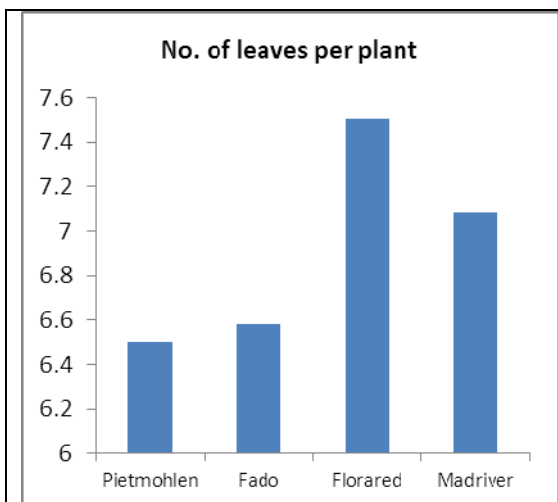


Fig 2. Number of leaves per plant of exotic Gladiolus cultivars

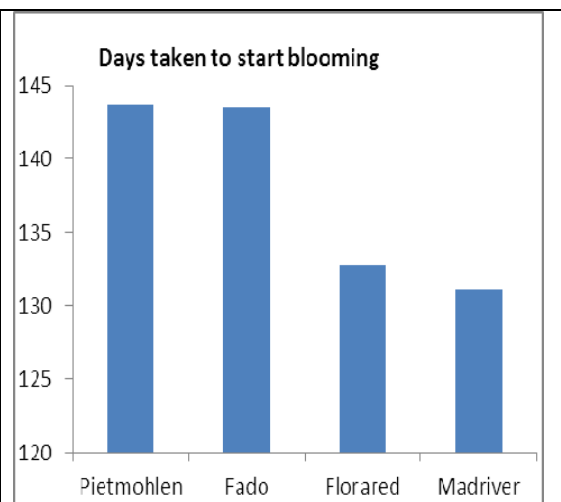


Fig. 3. Days taken to start blooming of exotic Gladiolus cultivars

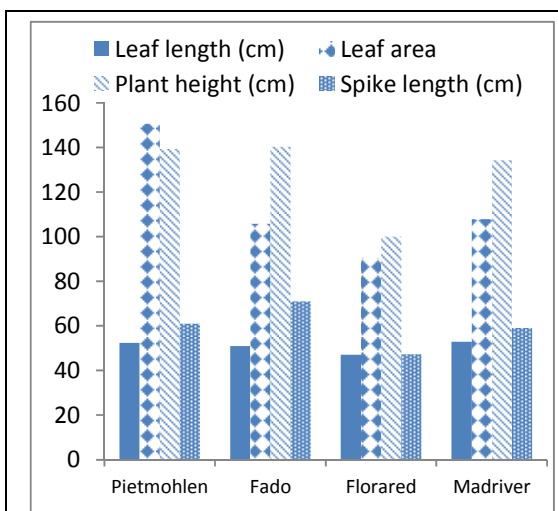


Fig 4. Leaf length, leaf area, plant height and Spike length of exotic Gladiolus cultivars

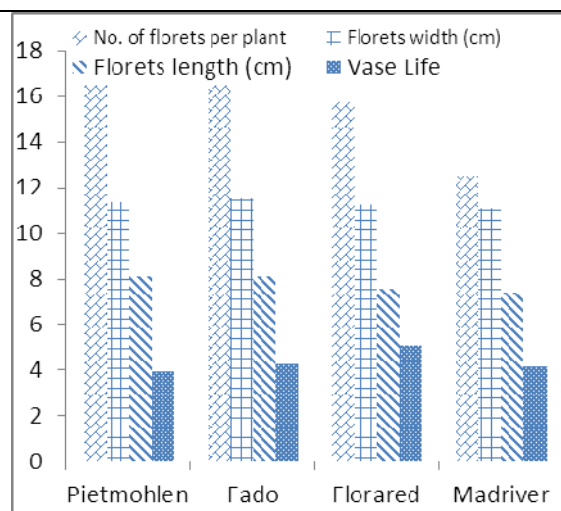


Fig. 5. No. of florets per plant, floret width, floret length and vase life of exotic Gladiolus cultivars

**Discussion**

Floriculture has emerged as potential trade due to divergence of growers towards high value floral crops and utilization in social, industrial and religious festivities (Riaz *et al.*, 2007). Among different flowers, *Gladiolus* hybrids are among the preferred cut flowers due to their different sizes, shades and excellent vase life. Four gladiolus cultivars were tested in this experiment. There were significant differences between gladiolus cultivars for growth and yield characteristics, which suggested that along with genetic

diversity, and agro-climatic conditions and management practices, cultivar selection play central role in determining yield and final product quality.

Statistically significant variations in vegetative characters like number of leaves per plant, leaf length and leaf area were recorded under this study. This might be due to their genetic alignment, which interacts differently to soil and climatic conditions (Saifullah and Ahmad, 2001). Number of leaves per plant, leaf length and leaf area

was significantly different among different cultivars might be due to the genetic variation and difference in adaptation to the agro-climatic condition (Balaram *et al.*, 2009; Pragma *et al.*, 2010; Saleem *et al.*, 2013). Similar results were also reported by Ahmed *et al.* (2002) who observed that different cultivars showed variable responses for vegetative characteristics. Phenotypic and genetic difference has been achieved by controlled hybridization and found the variation in gladiolus for characters like number of leaves per plant and leaf length (Cantor *et al.*, 2003; Biswanath, 2005; Ghimiray, 2005).

Significant variations in floral characteristics of gladiolus cultivars were noted in this study. These variations among floral features of the Gladiolus cultivars have been observed under diverse agro climatic conditions (Al-Humaid, 2004; Zubair *et al.*, 2006; Javvad *et al.*, 2012). Number of days taken to first blooming and number of florets per plant were differed significantly for different cultivars, might be due to the difference in genetic prospective and efficient utilization of natural resources and inputs (Shaukat *et al.*, 2013). Floret length and floret life are among the most attractive characters of the gladiolus which was significantly differed among cultivars might be due to genetic variation (Ahmed *et al.*, 2002; Ghimiray, 2005; Sheikh *et al.*, 2006; Read and Jones, 2008).

### Conclusion

The evaluation of different cultivars of gladiolus was conducted under the Rainfed conditions of Rawalpindi. Four exotic gladiolus cultivars Pietmohlen, Fado, Florared and Madriver were evaluated for their adaptability and performance. Results showed that all the cultivars had significant differences for vegetative and floral characters. On the basis of their performance it is concluded that all the cultivars can be grown under Rainfed condition but Florared and Pietmohlen are more suitable for cultivation under such conditions.

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