

## Original Research Article

# On-farm Evaluation of Different Cultivars of Chrysanthemum under the Climatic Conditions of Western Uttar Pradesh

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## ABSTRACT

The present study was conducted at farmer's field under the Krishi Vigyan Kendra, Ghaziabad, Uttar Pradesh during 2017-2018 to evaluate different cultivars of Chrysanthemum (*Dendranthema grandiflora* L.) under the climatic condition of western Uttar Pradesh. The experiment was laid out in randomized block design (RBD) with three replications. The experiment comprised of ten cultivars of chrysanthemum viz. Discovery, Neelima, White Prolific, Pusa Aditya, Pusa Centenary, Thai Chin Queen, Pusa Anmol, Pusa Arunima, Pusa Kesari and Pusa Chitraksha. It is clear from the experimental analysis that all the vegetative characters were significantly affected by different varietal treatments. Maximum plant height (53.07 cm), number of primary branches per plant (10.50), length of leaves (4.27 cm) were recorded with Pusa Aditya followed by Pusa Kesari and Pusa Anmol, respectively.

## Keywords

Marigold, Jasmine, Tuberosa, Chrysanthemum, Rose, Carnation, Gladiolus

## Introduction

Floriculture has become a lucrative industry in many countries as a result of scientific techniques and steady supply of improved plant material. Total value of different floricultural products at wholesale level has been estimated to be over 50 billion US\$ from about 2 m ha area in the world. Indian floriculture industry is also fast becoming aware of the importance of offering products as per the wishes of consumers. India is

known for growing of traditional flowers such as marigold, jasmine, tuberosa, chrysanthemum, rose, carnation, gladiolus, gerbera etc. Chrysanthemum (*Dendranthema grandiflora* L.) is one of the most important flower crops commercially grown in different parts of India. It is commonly known as Guldaudi, Autumn Queen or Queen of the East belonging to family Asteraceae. It is the native to the northern hemisphere chiefly Europe and Asia. The wide variation exhibited by large number of genotypes

makes it conceivable for flower crop. The variations among chrysanthemum varieties are large in response to environment particularly temperature and the interaction between temperature and cultivar occur for every developmental trait (Pleog and Heuvelink *et al.*, 2006). The factors accounting for variation in growth and yield of crop plants are of very complex nature. The growth and yield are known to be influenced by the environment and the genetic potential to a great extent. The former is controllable to some extent through cultural practices while the later is governed by the heredity. However, the genetic makeup of any crop can be exploited only when they are subjected to favorable environmental conditions. Therefore, in any crop plant, information on genetic characters particularly which those contribute to economic characters would be very useful in planning breeding programme leading to effective selection. Various bio-metrical techniques have been developed to know the genetic architecture of quantitative characters. There was no comprehensive report on evaluation of Chrysanthemum cultivars for vegetative and flora parameter under agro climatic condition of Gwalior, hence the present study was undertaken to study the performance of different Chrysanthemum cultivars in western UP.

### **Materials and Methods**

The present study was conducted at farmers field under the Krishi Vigyan Kendra, Ghaziabad, Uttar Pradesh, during the year 2017-18 to evaluate different cultivars of Chrysanthemum (*Dendranthema grandiflora* L.) under the climatic condition of western Uttar Pradesh. The experiment comprises of twelve different varieties of Chrysanthemum tested under western Uttar Pradesh condition. The soil type of experimental field was loam and sandy loam in nature. The experiment

was laid out in randomized block design (RBD) with three replications. All the cultural practices were practiced as per recommended except the variety wise planting material used as per treatment. The experiment field was ploughed thrice with the help of disc harrow followed by leveling. Then plots of 0.90 X 1.50 m were prepared and 2 kg of well rotten FYM per plot was added and mixed thoroughly into the soil. Nitrogen, Phosphorus and Potash applied 30g, 60g, and 17g per plot, respectively. These nutrients supplied by Urea, DAP and MOP. Some amount of nitrogen was supplied by DAP and remaining nitrogen was applied through urea as top dressing at 30 days after sowing. Data for different morphological characters was recorded and analysed to find out the result of the investigation.

### **Results and Discussion**

The observation on the plant growth, phenological parameters flowering character and yield which were recorded have been tabulated, statistically computed and the same are presented here under the appropriate headings (Fig. 1 and 2).

#### **Plant height (cm)**

The data recorded on plant height at harvest was statically analysed and presented in (Table 1). The plant height of chrysanthemum was significantly influenced by different cultivars. The maximum plant height was recorded in Pusa Aditya (53.07 cm). However, it was at par with Pusa Kesari, Pusa Anmol and Pusa Centenary. The minimum plant height was recorded in the variety Thai Chin Queen (33.77 cm). This might be caused by varietal characters responsible by a gene (Jamal Uddin *et al.*, 2015). As a genetically controlled factor, plant height varied among the cultivars of chrysanthemum (Baskaran *et al.*, 2009).

Vrsek *et al.*, (2006) reported that the higher plant height obtained from plants could be attributed to increased photosynthetic capacity of the plants in asters.

### **Plant spread (cm)**

The plant spread indicates the growth and vigour of plant. It may also affect the plant productivity. The results presented in the table 1, revealed that different varieties significantly influenced the plant spread during the entire period of plant growth. There is a steady increase in plant spread irrespective of varieties during the entire crop growth period. The maximum plant spread was observed in Pusa Aditya (21.30 cm). This was followed by the cultivars Pusa Kesari (21.29) and Pusa Anmol (19.50). However, the minimum plant spread was recorded in the cultivars Thai Chin Queen (15.37 cm). The difference in plant spread per plant is a varietal trait as it is governed by the genetic makeup. Similar variations in plant spread per plant among varieties were also observed in China aster by Rao and Negi (1990) and Ravikumar (2002).

### **Number of primary branches per plant**

Different cultivars of chrysanthemum produced significant difference in number of primary branches per plant. The number of primary branches per plant ranged from 7.90 to 10.50. Maximum number of primary branches per plant was recorded under the cultivar Pusa Aditya (10.50). This was significantly higher than Neelima, Pusa Chitraksha, Pusa Arunima, White Prolific, Discovery and Thai Chin Queen and was at par with Pusa Kesari (9.70), Pusa Anmol (9.50) and Pusa Centenary (9.37). A wide range of variation in this parameter might be due to influence of genetical makeup of chrysanthemum cultivars (Chezhian *et al.*,

1985 and Kanamadi and Patil, 1993). The result obtained by Shaukat *et al.*, (2015) for varietal performance was in conformity of present findings. Variation among the varieties for number of branches per plant was also reported in chrysanthemum (Swaroop *et al.*, 2008 and Singh *et al.*, 2008).

### **Length of leaves (cm)**

The length of leaves ranged from 2.20 to 4.27 cm. Maximum size of leaves per plant was recorded under the cultivar Pusa Aditya (4.27 cm) which was significantly higher than Pusa Kesari (3.67 cm), Pusa Anmol (3.57 cm) and Discovery (2.87 cm). The variation in the vegetative growth parameters were attributed to genetic factors whose performance will be varied over a wide range of environment conditions. Greater leaf area may lead to more dry matter accumulation, which resulted in the accumulation, which resulted in the accumulation of maximum photosynthates that contributed to produce bigger sized flower or more number of flowers (Jamal Uddin *et al.*, 2015). Variation in leaf area indicates additive gene effects would be effective in Gerbera (Nair and Shiva, 2003), Dahlia (Vikas *et al.*, 2011) and in Chrysanthemum (Barigidad and Patil, 1992).

### **Flower characters**

#### **Days to first bud initiation of chrysanthemum**

Days for first bud initiation of chrysanthemum was recorded when the first bud were shown in the field. As shown in the table 2. The minimum days to first floret was observed in Pusa Aditya (26.60) and was the earliest in bud initiations. Pusa Kesari (32.40) was found to be at par with Pusa Aditya for days to first bud initiation.

**Table.1** Effect of different cultivars on growth characters of Chrysanthemum

Treatment/Cultivar	Plant Height (cm)	Plant Spread (cm)	Number of primary branches plant <sup>-1</sup>	Length of leaves (cm)
Thai Chin Queen	33.77	15.37	7.90	2.20
Pusa Anmol	50.10	19.50	9.50	3.57
Pusa Arunima	43.60	17.27	9.03	3.10
Pusa Aditya	53.07	21.30	10.50	4.27
Pusa Chitraksha	43.80	17.60	9.04	3.40
Discovery	43.07	16.37	8.37	2.87
Neelima	46.20	17.67	9.04	3.47
White Prolific	43.57	17.13	8.57	3.00
Pusa Kesari	50.57	21.29	9.70	3.67
Pusa Centenary	47.97	18.27	9.37	3.50
<i>SE(m)±</i>	1.68	0.67	0.33	0.13
<i>CD</i> <sub>(p=0.05)</sub>	4.85	1.93	0.96	0.37

**Table.2** Effect of different cultivars on floral characters of Chrysanthemum

Treatment/Cultivar	Days taken to first but initiation	Number of flowers plant <sup>-1</sup>	Flower weight (g)	Flower diameter (cm)
Thai Chin Queen	39.17	18.00	18.47	4.10
Pusa Anmol	36.23	33.20	23.20	7.90
Pusa Arunima	37.57	19.80	20.40	6.07
Pusa Aditya	26.60	35.10	24.20	9.80
Pusa Chitraksha	37.53	26.60	21.40	6.40
Discovery	38.23	18.27	19.10	4.80
Neelima	37.27	30.73	22.30	7.07
White Prolific	37.73	18.60	19.47	5.67
Pusa Kesari	32.40	33.80	24.07	9.20
Pusa Centenary	37.17	31.40	22.60	7.23
<i>SE(m)±</i>	1.24	1.02	0.77	0.26
<i>CD</i> <sub>(p=0.05)</sub>	3.59	2.95	2.24	0.77

Fig.1

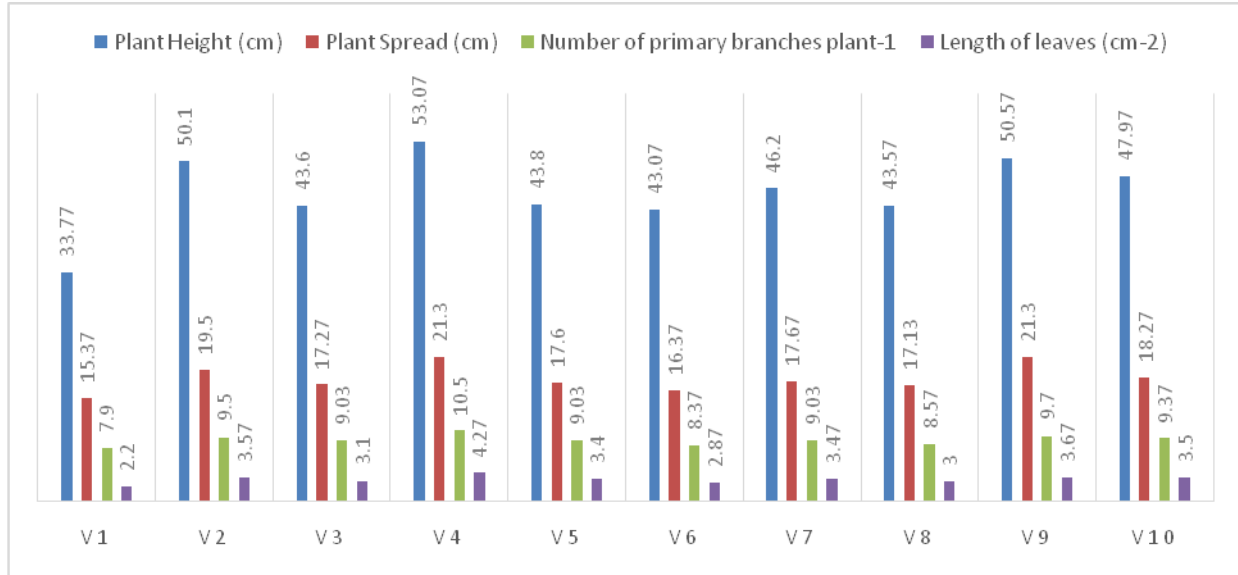
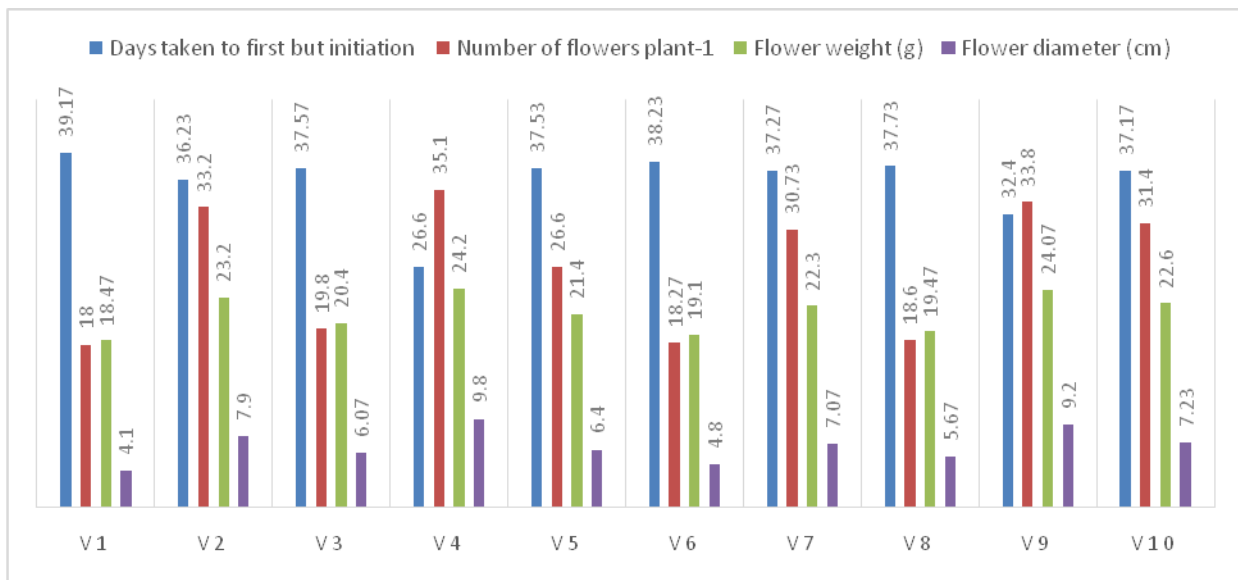


Fig.2



The maximum day for first bud initiation (39.17) was recorded with the cultivars Thai Chin Queen. Difference in number of days for flower bud initiation number of days for flowering among different cultivars might be due to sufficient genetic variability (Jamaluddin, 2015). Srilatha (2015) also reported the variation in time to flowering of different chrysanthemum genotypes.

### Number of flowers per plant

The data shown in the table 2 reveals that the maximum number of flowers per plant was recorded in variety Pusa Aditya (35.10) while minimum was observed in cultivar Thai Chin Queen (18) followed by Pusa Kesari (33.80), Pusa Anmol (33.20) and Pusa Centenary (31.40). More number of flowers might be

due to increase in morphological parameters like plant height, number of leaves and leaf area which might have contributed in production of more photosynthates resulting in greater accumulation of dry matter which in turn leads to production of a greater number of flowers per plant (Ramzan *et al.*, 2014). Variation of number of flowers and weight of flowers per plant due to genotypes has also reported (Barigidad and Patil, 1997) Saud and Talukdar (1999); Gantait and Pal (2011).

### **Weight of single flower (g)**

The maximum weight of a flower was observed in the cultivar Pusa Aditya (24.20 g) while minimum weight of a flower was recorded in cultivar Thai Chin Queen (18.47 g). However, the cultivars White Prolific (19.47 g), Discovery (19.10 g) and Thai Chin Queen (18.47 g) produced significantly less weight of a flower. The cultivar was significantly at par to Pusa Aditya in concern to weight of flower. The variation in weight of flower might be due to Variation of weight of flowers per plant due to genotypes has also been reported by Barigidad and Patil., (1997), Saud and Talukdar (1999), and Gantait and Pal, (2011). The variation in flowering duration among the varieties was attributed to genotype of the plant, environmental influence and other management factors.

### **Diameter of flower (cm)**

The diameter of flower was maximum in Pusa Aditya cultivars (9.80 cm) while it is recorded minimum in cultivars Thai Chin Queen (4.10 cm), cultivars Pusa Anmol (7.90 cm) and Pusa Kesari (9.20 cm) were found to be at par with Pusa Aditya for diameter of flower. The cultivars used in experiment were statistically at par with diameter of flower of variety Pusa Aditya. The diameter of flowers varied significantly due to genetic influence

the cultivars and their selection under different environment. Similar finding has been also reported previously by Kanamadi and Patil (1993) and Rajashekaran *et al.*, (1985) in chrysanthemum.

The significant variations in all phenotypic character of chrysanthemum were observed in the investigation. Variations of all morphological character are determined by genetic makeup and even it influence of different cultivars performance. From the present experiment it can be concluded that the cultivar White Star was found superior in term of vegetative and floral character followed by Pusa Aditya Pusa Kesari, and Pusa Anmol.

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