Original Research Article

"PERFORMANCE OF DIFFERENT VARIETIES/HYBRIDS OF ZINNIA (*Zinnia elegans* L.) UNDER PRAYAGRAJ AGRO-CLIMATIC CONDITIONS"

ABSTRACT

An experiment entitled "Performance of different varieties/hybrids of Zinnia (*Zinnia elegans* L.) under Prayagraj agro-climatic conditions" was conducted at Horticultural Research Field, Department of Horticulture, Naini agricultural institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj during the year 2022? to identify the most suitable variety/hybrid or successful cultivation and the longest blooming period under Prayagraj agro-climatic conditions. Six varieties and one hybrid namely, Zinnia Orange, Zinnia Purple, Zinnia White, Zinnia Red, Zinnia Yellow, Zinnia Double Yellow (Hybrid), and Zinnia Illuminated Deep Rose were selected for their evaluation. The experiment was laid out in Randomized Block Design (RBD) with 3 replications. The highest plant height (53 cm) and plant spread (43.1 cm) in the variety Zinnia Illumination Deep Rose were observed. However, the number of primary branches (5.3) in the variety Zinnia White was observed. Whereas, minimum days to first bud initiation (14.2 days), first flowering (29.7 days), and 50% of flowering (32.3 days) in variety Zinnia White were recorded. The maximum number of flowers per plant (12.7), flower diameter (8.4 cm), and duration of blooming (34.8 days) in the variety Zinnia Illumination Deep Rose were recorded.

Key words:-*Zinnia elegans*L., zinnia, performance, Agro-climatic conditions.

Introduction

Zinnia (*Zinnia elegans* L.) is a member of the family Asteraceae. It is the most familiar species, originally from the warm regions of Mexico being a warm-hot climate plant. It is a bushy plant with tolerance to low temperatures, but it cannot survive in frost. Most species have upright stems but have a lax habit of spreading stems that mound over the surface of the ground. They are easy to grow with potential heavy blooms that gush in color.

The flower responds well to high temperatures. They are popular garden flowers because they come in a wide range of flower colors and shapes, they can withstand hot summer temperatures, and are easy to grow from seeds. They need to have full sunlight and adequate water. Most varieties are prolific bloomers, making them excellent for landscape. They are also available as compact varieties suitable for hanging baskets, beds, borders, and pots. The dwarf varieties are ideal for window boxes, edgings, and beds. The flowers are commonly used in flower arrangements and are also a cut flower crop. Their varied habits allow for use in several parts of a garden, and their tendency to attract butterflies and hummingbirds is seen as desirable. Different cultivars/hybrids of zinnia under diverse climate conditions behave in a different way. They begin flowering as young plants, continue to produce flowers throughout the growing season, and are excellent cut flowers. White Zinnia is also used to remedy of kidney and in the treatment of swelling or aches (Mantur, 1988). Warmer temperatures that shorten the development stages of determinate crops will diverse climatic conditions behave differently. Hence, there is a need to evaluate some of the promising cultivars of zinnia with an extended blooming period in these areas so that suitable cultivars could be recommended for commercial cultivation. Therefore, the present research has been designed to evaluate the performance of various zinnia varieties/hybrids and to identify suitable cultivars that perform better in the local climatic conditions of Prayagraj, Uttar Pradesh.

Materials and Methods

Study area and statistical method

The present study entitled "Performance of different varieties/hybrids of Zinnia (*Zinnia elegans* L.) under Prayagraj agro-climatic conditions" was carried out in 2022 at Horticulture Research Field, Department of Horticulture, Naini Agriculture Institute, Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Prayagraj (Uttar Pradesh) 211007. The site of the experiment is located 98 meters from sea level at 25.57º N latitude 81.51º E longitude and has a typical subtropical climate with extremes of summer and winter. The maximum temperature of the location reaches up to 46ºc - 48ºc and seldom falls as low as 4ºc - 5ºc during winter. The average rainfall in this area is around during the winter season, especially in December and January the average rainfall in this area is around 1027 mm annually with maximum concentration from July to September with few showers and also drizzles in winter.

The experiment was laid out in Randomized Block Design (RBD) with six varieties and one hybrid namely, Zinnia Orange, Zinnia Purple, Zinnia White, Zinnia Red, Zinnia Yellow, Zinnia Double Yellow (Hybrid), and Zinnia Illuminated Deep Rose were selected for their evaluation. The seeds were procured from different private companies and sown in pro trays during February 2022. The well-grown seedlings of zinnia varieties/hybrids were transplanted into the main field with a spacing of 30 × 30 cm during March 2022. During transplanting, a handful of vermicompost was applied per pit. Light irrigation was done immediately after the transplanting of seedlings. Observations were made on various vegetative growth and flowering parameters. The data that was collected was analyzed using statistical methods.

Results and Discussion

Performance of Zinnia cultivars for vegetative parameters

There were significant differences among the varieties concerning vegetative parameters (Table 1). The maximum plant height was recorded in the variety Zinnia Illumination Deep Rose (53 cm), which is found to be at par with Zinnia White (50 cm), followed by the variety Zinnia Orange (48.1 cm). While the minimum plant height was recorded in the variety Zinnia Red (42 cm). The significant variation concerning plant height among the chrysanthemum varieties was also noticed by Joshi *et al.*, (2010), Rao and Shushma (2014), Srilatha *et al.*, (2015), Pasha *et al.*, (2015) evaluate the performance of zinnia cultivars for morphological traits under the agro-

climatic conditions of Faisalabad. Significantly, the maximum plant spread was found in the variety Zinnia Illumination Deep Rose (43.1 cm), which is found to be at par with the variety Zinnia White (42.2 cm) and variety Zinnia Purple (40.4 cm), followed by the variety Zinnia Orange (39 cm). While the minimum plant spread was found in the variety Zinnia Yellow (35.9 cm). Kumar, S. and Marwein, B. (2018) studied the evaluation of Zinnia (*Zinnia elegans* L.) Genotypes in West Garo Hills District, Meghalaya, India. Significantly, the maximum number of primary branches were found in the variety Zinnia White (5.3 branches), which is found to be at par with the variety Zinnia Illumination Deep Rose (5.1 branches), followed by the variety Zinnia Purple (4.8 branches). While the minimum number of branches per plant was recorded in the variety Zinnia Double Yellow (3.8 branches). The significant variation concerning the number of primary branches per plant among the China aster varieties was also noticed by Rai and Chaudhary (2016), Bhagve *et al.,* (2019), Dharmendra *et al.,* (2019), and in marigold by Patokar *et al.,* (2018).

Performance of Zinnia cultivars for floral parameters

There were significant differences among the varieties concerning vegetative parameters (Table 2). Significantly, the minimum days taken to first bud initiation was recorded in the variety Zinnia White (14.2 days), followed by the variety Zinnia Purple (17.4 days). Whereas, the maximum days taken for first flower initiation was recorded in the variety Zinnia Double Yellow (23.6 days). The significant variation concerning days taken to first bud initiation among the Dahlia varieties was also noticed by Baburao et al., (2018), Shukla et al., (2018), and Mounika and Saravanan (2019). Significantly, the minimum days taken to first flowering was recorded in the variety Zinnia White (29.7 days), which is found to be at par with the variety Zinnia Illumination Deep Rose (31.1 days) and followed by the variety Zinnia Purple (32.4 days). Whereas, the maximum days taken to first flowering was recorded in the variety Zinnia Double Yellow (34.6 days). The significant variation concerning days taken to first flowering among French marigold varieties was also noticed by Kumar et al., (2015) and in Chrysanthemum by Kumar and Polara (2017). Significantly, the minimum number of days for 50% flowering was recorded with the variety 'Zinnia White' (32.3 days) which was statistically at par with the variety 'Zinnia Illumination Deep Rose' (33.3 days), followed by 'Zinnia Double Yellow' (34.8 days). Whereas, the maximum days taken to 50% flowering was recorded in the variety 'Zinnia

Yellow' (36.6 days). The significant variation concerning days for 50% flowering among the African marigold varieties was also noticed by Patokar et al., (2018), Suvija et al., (2019), and in China aster by Atal et al., (2019). Significantly, the maximum flower diameter was found in the variety Zinnia Illumination Deep Rose (8.4 cm), which is found to be par with the variety Zinnia White (8.2 cm), followed by the variety Zinnia Orange (8 cm). While the minimum flower diameter was recorded in the variety Zinnia Yellow (6.5 cm). The significant variation concerning flower diameter among the China aster varieties was also noticed by Rai and Chaudhary (2016), Sarkar et al., (2020), and in Marigold by Singh and Singh (2005). Sloan and Harkness (2008) studied the evaluation of zinnia cultivars for field-grown cut flower production. Significantly, the maximum duration of blooming was recorded in the variety Zinnia Illumination Deep Rose (34.8 days), followed by the variety Zinnia White (29.8 days). Whereas, the minimum duration of flowering was found in the variety Zinnia Double Yellow (19.8 days). The significant variation concerning the duration of blooming among the chrysanthemum varieties was also noticed by Negi et al., (2015) and in French marigold by Kumar et al., (2015).

Performance of Zinnia cultivars for quality characters

There were significant differences among the varieties concerning quality characters (Table 2). Significantly, the maximum number of flowers per plant was recorded in the variety Zinnia Illumination Deep Rose (12.7), which is found to be par with the variety Zinnia White (11.8), followed by the variety Zinnia Purple (9.4). Whereas, the minimum number of flowers per plant was found in the variety Zinnia Double Yellow (8). The significant variation concerning the number of flowers per plant among the chrysanthemum varieties was also noticed by Uddin et al., (2015), and in Zinnia by Ullah et al., (2019). Significantly, the maximum number of whorls was found in the variety Zinnia Illumination Deep Rose (4.3), followed by the variety 'Zinnia Double Yellow' (3.4). Whereas, the minimum number of whorls per head was found in the variety 'Zinnia Yellow' (1.7).

Table.1 Performance of Zinnia cultivars for vegetative parameters under Prayagraj agro-climatic conditions.

Cultivars	Plant height (cm)			Plant spread (cm)			Number of primary branches per plant		
	15 DAT	30 DAT	45 DAT	15 DAT	30 DAT	45 DAT	15 DAT	30 DAT	45 DAT
V_1- Zinnia Orange	21.4	27.1	48.1	10.8	20.8	39	1.8	3.8	4.6
V2- Zinnia Purple	20.8	24.8	46.6	10.9	21.2	40.4	1.7	3.4	4.8
V3- Zinnia White	19.4	26.0	50	11.1	22.3	42.2	2.7	4.2	5.3
V4- Zinnia Red	16.2	20.9	42	10.3	18.9	37.3	1.2	3.3	4.4
V5- Zinnia Yellow	16.6	21	43	10.1	19.7	35.9	1.3	3.6	4.2
V6- Zinnia Double Yellow	15.6	20	43.6	9.3	18.7	36.4	1	3.1	3.8
V7- Zinnia Illumination Deep Rose	21.9	29.2	53	11.4	21.7	43.1	2.4	4.4	5.1
$CD_{0.05}$	4.13	4.01	3.35	0.78	1.71	3.29	0.56	0.37	0.44
CV	12.31	9.34	4.05	4.13	4.71	4.72	18.25	5.68	5.32

Table.2 Performance of Zinnia cultivars for floral and quality characters under Prayagraj agro-climatic conditions.

Cultivars	Days taken to first bud initiation	Days taken to first flowering	Days taken to 50% flowering	Number of flowers per plant	Flower diameter (cm)	Number of whorls per head	Duration of blooming (days)
V_1- Zinnia Orange	19.6	33.1	35.1	9	8	3.1	26.4
V2- Zinnia Purple	17.4	32.4	35	9.4	6.6	2.7	26.3
V3- Zinnia White	14.2	29.7	32.3	11.8	8.2	3.3	29.7
V4- Zinnia Red	21.6	34.1	36.2	8.4	6.5	2.3	24.1
V5- Zinnia Yellow	22.2	34.6	36.6	8.7	6.4	1.7	20.1
V6- Zinnia Double Yellow	23.6	32.9	34.8	8	7.7	3.4	19.8
V7- Zinnia Illumination Deep Rose	20	31.1	33.3	12.7	8.4	4.3	34.8
$CD_{0.05}$	0.86	1.78	1.80	1.27	0.38	0.59	1.75
CV	2.45	3.07	2.92	10.38	2.90	11.08	3.79

Conclusion

The present investigation that the different zinnia varieties/hybrids under study showed significant variation in all the parameters observed. The variety Zinnia Illumination Deep Rose reported significantly better performance in most of the parameters like plant height, plant spread, number of flowers per plant, flower diameter, and duration of blooming. The variety Zinnia White also reported significantly better performance in terms of days taken to first bud initiation, days have taken to first flowering, and days to 50% flowering. Zinnia Illumination Deep Rose has the longest blooming period of all varieties.Hence, the varieties Zinnia Illumination Deep Rose and Zinnia White can be recommended for garden display under Prayagraj agro-climatic conditions for their better performance and longer blooming duration/period.

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