

Original Research Article

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Appraisal's Genotypes on Water Absorption, Transpiration Loss at Senescence Stage and Genetic Correlation of *Chrysanthemum morifolium*

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ABSTRACT

A field experiment entitled “Appraisal's genotypes on water absorption, transpiration loss at senescence stage and genetic correlation of *Chrysanthemum morifolium*” was conducted at Experimental Orchard, Department of Horticulture, CCS Haryana Agricultural University, Hisar (Haryana) during the 2016-17 in winter season to identify the suitable variety for successful cultivation as well as vase life of Chrysanthemum flower. Fifteen Genotypes namely, Aparajita, Anastasia, Braca Splendid, Charlia, Celtic, Cologne, Fortune, HF-164, Paladov Sunny, Paiwer-W, Paladov Dark, Papaya, Tocovar- 6, Vanilla Sorbet and White Double were selected for the evaluation. The significant responses in water absorption, transpiration loss at senescence stage and flower vase life were observed in White Double, Cologne, Charlia and Celtic. The maximum water absorption and transpiration loss were recorded in genotype White Double (116.83g and 72.20 ml. respectively) whereas maximum fresh weight was recorded with the genotype Cologne (120.00 g) while genotype White Double had longest vase life (20.66 days). The maximum per cent of opened flowers were noticed in the genotype Charlia (92.45 %) while maximum unopened flowers were noticed in genotype Celtic (21.86%) and the significant genetic correlation between different parameters and vase life of flowers were noted during experimentation.

Keywords

Chrysanthemum, appraisal, flowers vase life

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Introduction

Chrysanthemum (*Chrysanthemum morifolium* Ramat.), a native to northern hemisphere, chiefly Europe and Asia and distributed almost throughout the world mainly in China, Japan, Europe, USA and India, belongs to the family Asteraceae (Compositae) with chromosome number (2n) 18. Chrysanthemum is grown for cut flowers, loose flowers, potted plants and border plants in the garden. Flowers of spray type are suitable for making garlands,

veni, bracelets, flower decoration and religious offerings and bedding purpose due to its wide range of diversity in flower number, shape, size and colour. The resulting beverage is known simply as chrysanthemum tea. Total area under flower production in 2013-14 was 2.55 lakh ha with the production of loose and cut flowers 1754 and 543 thousand tonnes, respectively (Anonymous, 2014). The total area under flower production in Haryana in 2013-14 was 6,480 ha with a production of loose flowers 65.45 60 ha and cut flowers

11.26 thousand tonnes, respectively and total area under chrysanthemum crop was 60 ha with a production of loose flowers 60 tonnes and cut flowers 650 tonnes and (Anonymous, 2014). Baskaran *et al.*, (2010) recorded cut flowers of cultivar Arka Swarna had longest vase life of 16 days. Banaee *et al.*, (2013) studied the effects of salicylic acid (SA), 8-Hydroxyquinoline sulphate (8-HQS) and sucrose on cut flowers of Gerbera and concluded that the flowers of gerbera, in solution of SA (100 mg L⁻¹) + 8-HQS (200 mg L⁻¹) had the longest vase life of 15.6 days. Evaluated the performance of fifteen chrysanthemum cultivars for better flower quality, flower yield and recorded that Cultivar Jaya had the maximum vase life Reddy *et al.*, (2016). Therefore, the experiment was undertaken to find out appraisal's genotypes on water absorption, transpiration loss at senescence stage and genetic correlation of chrysanthemum.

Materials and Methods

The experiment on chrysanthemum was conducted at Experimental Orchard, Department of Horticulture, CCS Haryana Agricultural University, Hisar (Haryana) during 2016-17 in winter season. It is a semi-arid zone and situated at an altitude of 215 meters above mean sea level, geographical situation is 29.09°N latitude and 75.43°E longitude in western Haryana and annual rainfall (about 450 mm) is received during July to September. Fifteen genotype of *C. morifolium* namely, Aparajita, Anastasia, Braca Splendid, Charlia, Celtic, Cologne, Fortune, HF-164, Paladov Sunny, Paiwer-W, Paladov Dark, Papaya, Tocovar- 6, Vanilla Sorbet and White Double were selected for the appraisal which were replicated three with Randomized Block Design (R.B.D.) in 1×1 m plot size, seed spaced at 20×20 cm and all package of practice adopted uniformly. Observations on various parameters like water

absorption (g), transpiration loss (ml), fresh weight of flower (g), vase life of flowers and (days), percent of flowers opened, unopened and genetic correlation were recorded on five plant of each genotypes. Statistical analysis was performed using window based computer package OPSTAT, calculated value of 'r' was compared with 't' table value with n-2 degrees of freedom at 5% of significance, where, n refers to number of pairs of observations.

Results and Discussion

Water Absorption (g)

It is evident from table-1 illustrate that the water absorption (g) by the cut flower after one week and at senescence stage differed significantly with the genotypes. The maximum (116.83 g) water absorption by the cut flower after one week stage was recorded in genotype White Double and minimum (40.21 g) in genotype Braca Splendid, however at senescence stage, the cut flower of genotype White Double absorbed maximum (150.56 g) water and minimum (66.73 g) by the cut flower of genotype Anastasia. Zamani *et al.*, (2011) investigated the effect of different concentrations of salicylic acid (SA), malic acid (MA), citric acid (CA) and sucrose on keeping quality and vase life of chrysanthemum cut flowers and observed that malic acid and salicylic acid treatments increased cut flower water absorption. Srivastava *et al.*, (2015) found that the maximum water absorbed in treatment T2 (4% sucrose) as compared to control (Tap water).

Transpiration loss (ml)

Data presented in table-1 demonstrate the transpirational loss (ml) differed significantly with different genotypes. After one-week, the maximum (72.20 ml) transpirational loss was recorded in genotype White Double and minimum (9.95 ml) in genotype Braca

Splendid, while at senescence stage the maximum (113.01 ml) transpirational loss was noticed in genotype White Double and minimum in genotype Braca Splendid (26.25 ml). While evaluating the performance of ten genotypes of chrysanthemum under open field conditions at University of Agricultural Sciences, Bangalore, Baskaran *et al.*, (2010) reported that the cultivar Arka Swarna lost maximum amount of water.

Fresh weight of flower (g)

The data characterize in table-2 illustrate that the fresh weight of chrysanthemum flower (g) differed significantly with different genotypes. The maximum fresh weight of flower was recorded in genotype Cologne (120.00 g), which was followed by genotype Fortune (95.18 g) and the minimum in genotype

Vanilla Sorbet (31.46 g). Baskaran *et al.*, (2010) were evaluated ten cultivars of chrysanthemum and found that the cultivar Arka Swarna attained the maximum fresh weight.

Vase life of flower and stem (Days)

The data pertaining in table-2 indicate that different genotypes differed significantly with respect to vase life of flowers and stems (days). The genotype White Double had longest vase life (20.66 days), which was closely followed by the genotype Celtic (19.66 days), however, the genotype Paladov Dark had shortest vase life (11.33 days), which was closely followed by the genotype Cologne (11.66 days). Variation among the genotypes was also reported by Baskaran *et al.*, (2010), Banaee *et al.*, (2013) and Reddy *et al.*, (2016).

Table.1 Performance of chrysanthemum genotypes on Water absorption, Transpirational loss (ml) after one week and at senescence stage

Popu- lation No.	Genotypes	Water Absorption (g)		Trapirational loss (ml)	
		After one week (695.99g)*	At senescence stage (695.99g)*	After one week (500ml)*	At senescence stage (500ml)*
V ₁	Aparajita	87.18	116.61	50.45	80.58
V ₂	Fortune	92.36	123.76	49.64	82.40
V ₃	Anastasia	43.22	66.73	11.15	26.46
V ₄	Charlia	83.53	113.73	48.38	79.10
V ₅	Vanilla Sorbet	77.88	111.28	50.81	77.43
V ₆	Paladov Sunny	76.44	108.75	46.62	75.47
V ₇	White Double	116.83	150.56	72.20	113.01
V ₈	Braca Splendid	40.21	73.81	09.95	26.25
V ₉	Celtic	52.62	82.53	12.20	30.34
V ₁₀	Paiwer-W	79.56	109.87	38.35	70.04
V ₁₁	HF-164	85.48	114.54	44.75	74.53
V ₁₂	Paladov Dark	85.91	115.71	42.54	74.68
V ₁₃	Tocovar- 6	40.92	70.76	16.85	30.69
V ₁₄	Papaya	66.72	95.40	32.71	55.42
V ₁₅	Cologne	84.68	95.40	42.64	75.68
C.D. at 5% level of significance		0.60	0.50	1.59	2.38

Table.2 Performance of chrysanthemum genotypes on fresh weight and Vase life of flowers and stems

Population No.	Genotypes	Fresh weight of flower (g)	Vase life of flowers and stems (days)
V ₁	Aparajita	85.25	14.66
V ₂	Fortune	95.18	17.33
V ₃	Anastasia	55.44	13.33
V ₄	Charlia	78.40	14.66
V ₅	Vanilla Sorbet	31.46	13.33
V ₆	Paladov Sunny	81.33	14.33
V ₇	White Double	64.10	20.66
V ₈	Braca Splendid	67.31	14.33
V ₉	Celtic	34.46	19.66
V ₁₀	Paiwer-W	68.31	13.66
V ₁₁	HF-164	44.41	13.33
V ₁₂	Paladov Dark	82.26	11.33
V ₁₃	Tocovar- 6	39.51	14.66
V ₁₄	Papaya	70.25	16.66
V ₁₅	Cologne	120.00	11.66
C.D. at 5% level of significance		4.08	2.90

Table.3 Genetic correlation between different genotypes

	VL	FFW	WA	WA2	TL	TL2	NFO
VL							
FFW	-0.282						
WA	0.187	0.424**					
WA2	0.200	0.413**	0.996**				
TL	0.131	0.347*	0.962**	0.967**			
TL2	0.121	0.404**	0.983**	0.986**	0.995**		
NFO	0.436**	0.279	0.298*	0.289	0.326*	0.311*	
NFU	0.786**	-0.026	0.179	0.204	0.158	0.162	0.574**

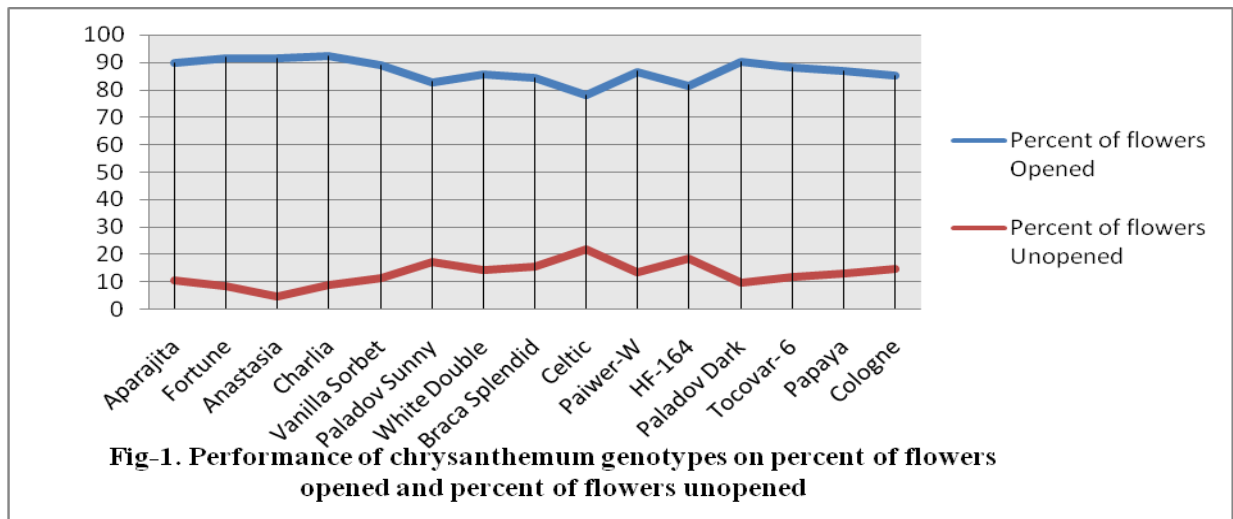


Fig-1. Performance of chrysanthemum genotypes on percent of flowers opened and percent of flowers unopened

Percent flowers opened and unopened (%)

Data showed in fig-1 illustrate that the percent of flowers opened differed significantly with different genotypes. The maximum percent flowers opened was found in genotype Charlia (92.45 %), which was closely followed by the genotype Fortune (91.75%) and Anastasia (91.42 %), while the minimum percent flowers opened was found in genotype Celtic (78.14 %). Significantly with respect to percent of flowers unopened (%). The genotype Celtic had maximum percentage of unopened flower (21.86%), while the genotype Anastasia had minimum percentage of unopened flower (4.57%).

Genetic correlation between different cultivars

As shown in table-4 the genetic correlation between different genotypes of chrysanthemum. Vase life was highly correlated with number of flowers opened and unopened, fresh flower weight with water absorption after one week and at senescence stage, transpirational loss after one week and at senescence stage, Water absorption was highly correlated with Water absorption at senescence stage, transpirational loss after one week and at senescence stage and correlated with number of flowers opened.

Water absorption at senescence stage was highly correlated with transpirational loss after one week and at senescence stage, transpirational loss after one week with transpirational loss at senescence stage and correlated with number of flowers opened. Transpirational loss at senescence stage was correlated with number of flowers opened and number of flowers opened was correlated with number of flowers unopened. Similar results were observed by Pal and George (2002), Gantait and Pal (2009) and Kumar *et al.*, (2012).

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