



EVALUATION OF CHRYSANTHEMUM (*Chrysanthemum morifolium* Ramat) GENOTYPES UNDER WEST GARO HILLS DISTRICT, MEGHALAYA

Niki Dewan¹, Sunil Kumar^{1*}, Swati Sharma² and Susmita Chakraborty¹

¹Department of Horticulture, North Eastern Hill University, Tura Campus, Tura-794 002, West Garo Hills District, Meghalaya

²ICAR-National Research Centre on Litchi, Muzaffarpur-842 002, Bihar, India

*Corresponding Author's E-mail: sunu159@yahoo.co.in

ABSTRACT : Evaluation of Chrysanthemum genotypes under West Garo Hills District, Meghalaya was carried out at the experimental farm, Department of Horticulture, North Eastern Hill University, Tura, Meghalaya 2015-2016 to identify the suitable variety for successful cultivation and flower production. Fifteen varieties namely, Korean Red, Korean Yellow, Solan Shringar, Ramblored, Yellow Star, Calabria, Ajay, AAU Yellow, White Star, Korean Bicolour, Charming, Lysid, Safin, Shayana and Gambit were selected for their evaluation. The experiment was laid out in randomized block design with three replications. Uniform package of practices were followed throughout the experiment to grow a healthy crop. Significant response in vegetative and flowering characters was observed in cultivar Calabria, Yellow Star, AAU Yellow, Gambit and Solan Shringar. Highest plant height (49.65 cm) in cultivar Yellow Star followed by cultivar Gambit (45.46 cm) was noticed. However, cultivar Solan Shringar showed maximum number of branches (12.51) and number of leaves per plant (125.11). Earliness in full bloom was associated with cultivar Shayana (72.29 days) followed by cultivar Calabria (82.44 days), while, maximum flower longevity after full bloom was observed in cultivar Gambit (24.72 days). Extended flowering duration was recorded with cultivar Calabria (140.84 days). Whereas, maximum vase life under tap water was observed in cultivar Ramblored (9.44 days) followed by cultivar Gambit (8.37 days). Cultivar Gambit showed maximum flower diameter (8.46 cm), flower head height (3.14 cm), number of ray florets per head (186.30), flower fresh weight (1.36 g) and dry weight (0.43 g), while, maximum number of flower head per plant (42.34), number of flowers per spray per plant (21.84) and number of sprays per plant (20.50) was observed in cultivar Calabria.

Keywords : *Chrysanthemum*, evaluation, vegetative growth, flowering, quality, vase life.

Chrysanthemum (*Chrysanthemum morifolium* Ramat) is a popular flower crop used for cut flower, loose flower, garland making, garden display, pot plant, etc. It occupies prime position among commercial flower crops which has high demand in both domestic and international market. Chrysanthemum is very rich in varietal wealth and every year there is an addition of new varieties. Chrysanthemum flowers are highly priced for its vast range of shape and sizes of flowers and ranges of colours. The fresh chrysanthemum flowers demand has steadily increased not only for decoration but also for many other purposes like essential oils, cosmetics, aroma therapy, dry flowers, pot pourries, natural dyes, medicines etc. West Garo Hills District, Meghalaya is agro-climatically very much suited for growing Chrysanthemum throughout the year. However, performance of cultivars is also influenced by agro-climatic factors. 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, 10). Hence there is a need to evaluate some of the promising cultivars of chrysanthemum with extended vase life in this area so that suitable cultivars could be recommended for commercial cultivation under this district. Therefore, present study was carried out to evaluate various chrysanthemum cultivars best suited to this region.

MATERIALS AND METHODS

An experiment was conducted at experimental farm, Department of Horticulture, North Eastern Hill University, Tura, Meghalaya from July 2015 to March 2016. The district is situated approximately between the latitudes 90° 30' and 89° 40' E and the longitudes of 26° and 25° 20' N. It has an average elevation of 349 metres (1145 feet). The prevailing weather of the region is sub-tropical, experiences a relatively high temperature in summer and cool winters. The average rainfall is 3300 mm of which more than two-thirds occur during the monsoon, winter being practically dry. The

Article's History:

Received : 28-07-2016

Accepted : 06-09-2016

experiment was laid out in randomized block design with fifteen treatments and three replications. Fifteen varieties namely, Korean Red, Korean Yellow, Solan Shringar, Ramblored, Yellow Star, Calabria, Ajay, AAU Yellow, White Star, Korean Bicolour, Charming, Lysid, Safin, Shayana and Gambit were selected for their evaluation. The experiment was conducted in pots using soil and well decomposed FYM (1 : 1). The chrysanthemum plants of the respective varieties were raised in nursery through terminal stem cuttings in trays filled with riverbed sand in the month of July, 2015. Afterwards, well rooted cuttings of chrysanthemum were transferred in polybags with similar potting mixture used for entire experimentation. The well established rooted varieties of chrysanthemum were transplanted in pots during second fortnight of August, 2015. Uniform package of practices were followed throughout the experiment to grow the healthy crop. Routine intercultural operations were done as per the requirement. Observations were made on various vegetative, flowering and quality characters as well as vase-life under tap water. The data collected were analysed using statistical methods as suggested by (Gomez and Gomez, 4).

RESULTS AND DISCUSSION

Performance of chrysanthemum cultivars for growth characters

Significant differences were observed in vegetative and flowering quality characters among the chrysanthemum cultivars. There were significant differences among varieties in respect to vegetative parameters (Table 1). Maximum plant height was recorded for the cultivar Yellow star (49.65 cm) followed by Gambit (45.96 cm) and Calabria (35.61 cm). However, lowest plant height was associated with cultivar Ramblored (10.48 cm) which was on par with cultivar Shayana (12.31 cm). The significant variation with respect to plant height among the chrysanthemum varieties were also noticed by Ona *et al.* (9), Srilatha *et al.* (16) and in gerbera by Singh *et al.* (13). The number of branches per plant was significantly higher in cultivar Solan Shringar (12.51) which was on par with Calabria (12.25), whereas, less number of branches per plant was noticed in cultivar Ramblored (2.12). Differences in vegetative characters of different cultivars of chrysanthemum may be due to varied growth rates and their genetic potential resulted in variation in phenotypic expression. More number of branches per plant among chrysanthemum varieties was also opined by Srilatha *et al.* (16) and Singh *et al.* (14).

Cultivar Solan Shringar recorded maximum number of leaves per plant (125.11) followed by Calabria (120.66) and Korean Yellow (100.52). However, increased leaf length and leaf breadth was observed in cultivar AAU Yellow (7.50 cm and 6.16 cm). Increased breadth of leaf might be governed by the inherent genotypic variation in cultivars. Cultivar Solan Shringar showed maximum E-W and N-S plant spread (29.75 cm and 21.89 cm). It might be due to bigger sized leaves produced by cultivars. Leaf production of any crop decides the spread of plant; leaves are the prime important functional units for photosynthesis, which greatly influence the growth and flower yield. These results are supported by Deka and Talukdar (3). Variation in plant spread may also be due to additive gene effects (Vidalie *et al.*, 22). Whereas, maximum leaf area was associated with cultivar AAU Yellow (46.08 cm²) followed by Korean Yellow (25.11 cm²) and Lysid (22.42 cm²). While, minimum leaf area was observed in Shayana (9.50 cm²). Similar results were observed by Vikas *et al.* (23) in dahlia genotypes.

Highest petiole length was recorded in cultivar AAU Yellow (4.33 cm) followed by Korean Red (3.16cm) and Ajay (2.25 cm) which was on par with cultivar Solan Shringar (2.25 cm). However, cultivar Yellow Star showed maximum stem diameter (3.75 cm) followed by Ajay (3.38 cm) and Gambit (3.33 cm). These results corroborate with the findings of Kumar *et al.* (7) in marigold. During entire investigation, it has been observed that different chrysanthemum cultivars showed variable responses for vegetative characteristics under similar growing media and environment. This might be due to their genetic composition which interacts differently to the soil and climatic condition of the prevailing area.

Performance of chrysanthemum cultivars for flowering characters

Chrysanthemum cultivars varied significantly for quality and flowering parameters (Table 2). Days to bud initiation and days to first colour shown were advanced in the cultivar Shayana (44.60 days and 56.15 days) which was on par with Calabria (46.31 days and 56.44 days) and Ajay (46.66 days and 60.67 days), whereas, delayed bud initiation was observed in cultivar Charming (95.45 days) and days to first colour shown in cultivar Solan Shringar (115.86 days). These results were in accordance with the findings of Vetrivel and Jawaharlal (21) in chrysanthemum. Deka and Talukdar (3) also noticed least number of days to first bud initiation in gerbera. The differences in bud initiation

Table 1 : Performance of Chrysanthemum cultivars for growth characters under West Garo Hills District, Meghalaya.

Cultivars	Plant height (cm)	No. of branches	No. of leaves	Leaf length (cm)	Leaf breadth (cm)	Plant spread (cm) E-W	Plant spread (cm) N-S	Leaf area (cm ²)	Petiole length (cm)	Stem diameter (cm)
T ₁ – Korean Red	25.67	7.33	84.33	5.33	4.00	16.66	18.33	21.66	3.16	2.51
T ₂ – Korean Yellow	31.52	9.46	100.52	6.20	4.12	14.20	15.43	25.11	1.85	2.02
T ₃ – Solan Shringar	31.22	12.51	125.11	4.75	4.34	29.75	21.89	20.29	2.25	2.81
T ₄ – Ramblored	10.48	2.12	40.67	4.48	4.17	14.48	10.18	18.11	2.03	2.69
T ₅ – Yellow Star	49.65	4.58	88.07	5.43	4.25	21.25	13.41	22.33	1.54	3.75
T ₆ – Calabria	35.61	12.25	120.66	5.71	3.69	17.41	13.36	19.67	2.33	1.30
T ₇ – Ajay	30.83	5.33	66.33	5.20	4.50	14.50	14.50	23.40	2.25	3.38
T ₈ – AAU Yellow	33.33	3.33	60.33	7.50	6.16	23.00	16.66	46.08	4.33	2.63
T ₉ – White Star	19.33	4.00	51.00	3.26	2.96	10.66	10.00	9.83	1.06	2.38
T ₁₀ – Korean Bicolour	24.67	5.33	67.33	5.56	4.10	16.33	17.33	25.01	2.06	2.69
T ₁₁ – Charming	23.32	5.75	62.22	5.57	4.55	12.88	17.88	25.10	1.72	3.30
T ₁₂ – Lysid	28.31	3.08	55.45	5.35	4.20	16.24	18.26	22.42	1.54	2.61
T ₁₃ – Safin	27.21	3.74	57.44	4.02	3.35	12.52	7.54	14.05	2.12	2.01
T ₁₄ – Shayana	12.31	5.54	38.23	3.54	2.63	8.54	12.23	9.50	1.55	2.76
T ₁₅ – Gambit	45.96	3.07	65.21	4.73	3.64	13.22	18.99	16.05	2.02	3.33
CD (P = 0.05)	2.47	0.59	2.59	0.63	0.66	1.37	0.62	1.60	0.29	0.34
CV	5.17	6.00	2.15	7.48	9.76	5.09	2.46	4.65	7.91	7.63

Table 2 : Performance of Chrysanthemum cultivars for flowering characters under West Garo Hills District, Meghalaya.

Cultivars	Days to bud initiation (days)	Days to first colour shown (days)	Days to full bloom (days)	Flower longevity after full bloom (days)	Flowering duration (days)	Spray length (cm)	Flower diameter (cm)	Flower head height (cm)	Vase life (days)
T ₁ – Korean Red	59.33	78.67	102.33	21.66	72.67	5.20	4.53	2.66	5.66
T ₂ – Korean Yellow	79.28	86.46	103.47	19.35	53.85	5.69	5.58	2.54	4.40
T ₃ – Solan Shringar	92.85	115.86	156.74	19.55	36.08	5.16	5.02	2.64	5.78
T ₄ – Ramblored	80.60	94.60	110.17	22.75	58.61	5.16	6.44	2.24	9.44
T ₅ – Yellow Star	94.65	107.48	119.14	17.04	22.33	2.58	4.38	1.64	6.44
T ₆ – Calabria	46.31	56.44	82.44	15.74	140.84	5.58	6.42	0.75	8.35
T ₇ – Ajay	46.66	60.67	85.00	21.00	117.00	5.23	3.23	1.70	8.00
T ₈ – AAU Yellow	86.66	97.00	110.33	12.33	107.55	5.36	5.73	1.60	5.66
T ₉ – White Star	65.33	74.33	89.33	13.00	64.00	2.93	4.40	2.30	7.33
T ₁₀ – Korean Bicolour	59.33	82.33	92.33	20.66	84.00	3.93	3.60	1.76	6.00
T ₁₁ – Charming	95.45	103.52	119.41	21.00	23.86	5.09	5.71	2.18	6.78
T ₁₂ – Lysid	56.57	76.12	92.37	16.54	84.05	4.41	3.48	2.32	7.21
T ₁₃ – Safin	51.09	76.08	86.82	17.18	83.42	4.41	4.46	1.98	5.79
T ₁₄ – Shayana	44.60	56.15	72.29	12.42	86.41	1.53	4.14	1.81	7.29
T ₁₅ – Gambit	74.40	82.58	119.19	24.72	71.51	4.31	8.46	3.14	8.37
CD (P = 0.05)	9.89	6.47	10.14	3.02	6.68	0.29	0.51	0.25	0.33
CV	8.59	4.65	6.31	9.86	5.42	3.94	5.99	7.28	2.86

might be due to genetical make up of the genotypes (Suma and Patil, 17).

Earliness in flowering was recorded with cultivar Shayana (72.29 days) followed by Calabria (82.44 days) and Ajay (85.00 days). While, cultivar Charming

took more days to full bloom (119.41 days). However, highest flower longevity after full bloom was associated with cultivar Gambit (24.72 days) followed by Korean Red (21.66 days) which was on par with cultivar Ajay (21.00 days) and Charming (21.00 days), while,

Table 3 : Performance of Chrysanthemum cultivars for quality characters under West Garo Hills District, Meghalaya.

Cultivars	Ray floret length (cm)	Ray floret width (cm)	No. of ray florets/head	Fresh weight of flower/head (g)	Dry weight of flower/head (g)	No. of flower head per plant	No. of flowers per spray per plant	No. of sprays per plant
T ₁ – Korean Red	1.70	0.43	178.33	0.68	0.10	16.33	8.33	8.00
T ₂ – Korean Yellow	2.60	0.42	45.57	0.73	0.08	19.23	9.89	9.33
T ₃ – Solan Shringar	2.63	0.62	60.09	0.68	0.06	16.50	6.74	9.76
T ₄ – Ramblored	4.22	0.84	90.54	1.14	0.17	17.25	4.00	13.25
T ₅ – Yellow Star	2.89	0.42	24.37	0.67	0.03	20.27	10.90	9.36
T ₆ – Calabria	3.18	0.72	14.22	0.82	0.07	42.34	21.84	20.50
T ₇ – Ajay	1.50	0.43	175.33	0.71	0.15	21.00	9.66	11.33
T ₈ – AAU Yellow	2.73	0.46	31.00	0.62	0.06	19.33	8.33	11.00
T ₉ – White Star	1.66	0.30	74.00	0.46	0.04	10.66	4.66	6.00
T ₁₀ – Korean Bicolour	1.36	0.33	166.66	0.78	0.04	17.00	10.66	6.33
T ₁₁ – Charming	2.48	0.44	123.42	0.93	0.08	21.79	14.05	7.74
T ₁₂ – Lysid	1.54	0.63	93.80	1.35	0.10	19.34	10.01	9.32
T ₁₃ – Safin	2.18	0.48	39.76	0.76	0.14	17.74	11.31	6.42
T ₁₄ – Shayana	1.82	0.35	55.35	1.19	0.08	11.54	7.35	4.18
T ₁₅ – Gambit	4.35	0.64	186.3	1.36	0.43	16.29	10.12	6.17
CD (P = 0.05)	0.23	0.08	12.98	0.10	0.01	0.96	0.88	0.95
CV	5.70	9.88	8.56	7.03	9.99	2.99	5.32	6.14

minimum flower longevity after full bloom was noticed with cultivar AAU Yellow (12.33 days). Earliness in gerbera flowering (Barua and Bordoloi, 2) and highest values in terms of flower longevity in dahlia (Vikas *et al.*, 23) had also been noticed. Number of days taken for flower bud appearance and first flowering is an important character that signifies earliness or late flowering and determines the flower availability. The variation in time to flowering might be due to the genotype or the influence of genotype and environment. The variation in time to flowering of different chrysanthemum genotypes was also reported by Rao and Pratap (11), Behera *et al.* (1) and Singh *et al.* (14) under different locations.

Longest flowering duration was recorded with cultivar Calabria (140.84 days) followed by Ajay (117.00 days) and AAU Yellow (107.55 days), whereas, cultivar Yellow Star showed least flowering duration (22.33 days). The variation in flowering duration among the varieties was attributed to genotype of the plant, environmental influence and other management factors. Similar results for variation in flowering duration among the genotypes have also been reported in chrysanthemum under different environmental conditions (Swaroop *et al.*, 18; Singh *et al.*, 15;

Rao and Pratap, 11). Maximum spray length was observed in cultivar Korean Yellow (5.69 cm) which was on par with Calabria (5.58 cm) and AAU Yellow (5.36 cm), while, cultivar Shayana showed minimum spray length (1.53 cm). Sarmah *et al.* (12) also reported more spray length in gerbera. However, increased flower diameter was noticed in cultivar Gambit (8.46 cm) followed by Ramblored (6.44 cm) which was on par with Calabria (6.42 cm), whereas, minimum flower diameter was observed in cultivar Ajay (3.23 cm). The increased flower diameter might be due to more number of ray florets recorded in the same genotypes. Variations in flower diameter among different chrysanthemum cultivars were also noticed by Negi *et al.* (8).

Cultivar Gambit showed maximum flower head height (3.14 cm) followed by Korean Red (2.66 cm) which was on par with Solan Shringar (2.64 cm) and was lowest in cultivar Calabria (0.75 cm). Prolonged vase life of the cut chrysanthemum flowers was observed in cultivar Ramblored (9.44 days) followed by Gambit (8.37 days) which was on par with Calabria (8.35 days), while, minimum vase life was associated with cultivar Korean Yellow (4.40 days). Variation in vase-life may be attributed to differential accumulation

of carbohydrates from varied leaf production, sensitivity of cultivars to ethylene and genetical framework of the plants. Similar results were observed by Singh *et al.* (13) in gerbera cultivars.

Performance of chrysanthemum cultivars for quality characters

Quality characteristics showed variable responses for the chrysanthemum cultivars under study (Table 3). Different chrysanthemum cultivars responded or interact with prevailing climatic conditions depending upon their genetic composition. Maximum ray floret length was associated with Cultivar Gambit (4.35 cm) followed by Calabria (3.18 cm) and AAU Yellow (2.73 cm), while, cultivar Korean Bicolor showed minimum ray floret length (1.36 cm). However, maximum ray floret width was recorded in the cultivar Ramblored (0.84ccm) followed by Calabria (0.72 cm) and Lysid (0.63 cm). These results corroborate with the findings of Vasudevan and Rao (20) in gerbera.

Highest number of ray florets per head was obtained in cultivar Gambit (186.3) which was on par with cultivars Korean Red (178.33) and Ajay (175.33). Whereas, minimum number of ray florets was found in cultivar Calabria (14.22). These results are in accordance with the findings of Kumar *et al.* (5) in gerbera and Talukdar *et al.* (19) in chrysanthemum. Maximum fresh weight and dry weight of flowers per head was associated with cultivar Gambit (1.36g and 0.43 g). The differences in fresh weight of flower head may be due to inherent characters of the individual cultivars. These findings are also in accordance with the results of Kumar (6) who reported wide differences in quality parameters among chrysanthemum cultivars.

However, cultivars Calabria had maximum number of flower head per plant (42.34) followed by Charming (21.79) and Yellow Star (20.27), while, minimum number of flower head was noticed in cultivar White Star (10.66). More number of flower head per plant was also reported by Ona *et al.* (9) and Srilatha *et al.* (16) in chrysanthemum. Maximum number of flowers per spray per plant was recorded in cultivar Calabria (21.84) followed by Charming (14.05) and Safin (11.31), whereas, least number of flowers per spray per plant was found in cultivar Ramblored (4.00). However, cultivar Calabria showed maximum number of sprays per plant (20.50) followed by Ramblored (13.25) and Ajay (11.33), while, cultivar Shayana had the minimum number of sprays per plant (4.18). Highest number of sprays per plant was also noticed in chrysanthemum (Kumar, 6).

CONCLUSION

The present investigation for evaluation of different genotypes of chrysanthemum, cultivars Calabria, Yellow Star, AAU Yellow, Gambit and Solan Shringar showed better performance for vegetative, flowering and quality characters under climatic conditions of Tura, West Garo Hills district, Meghalaya and recommended for its commercial cultivation. Also, considerable morphological variations were observed among vegetative and floral characters that could be considered as useful selection criteria for further improvement in chrysanthemum.

REFERENCES

1. Behera, T.K., Sirohi, P.S. and Anand, P. (2002). Assessment of chrysanthemum germplasm for commercial cultivation under Delhi condition. *J. Orn. Hort.*, **5** (2) : 11-14.
2. Barua, U. and Bordoloi, R. (2012). Performance of gerbera cultivars under low cost polyhouse. *Prog. Hort.*, **44** (1) : 37-39.
3. Deka, K. and Talukdar, M.C. (2015). Evaluation of gerbera cultivars for growth and flower character under Assam conditions. *J. Agri. Vet. Sci.*, **8** (4) : 28-30.
4. Gomez, K.A. and Gomez, A.A. (2010). *Statistical Procedure for Agricultural Research*, Wiley India (P) Limited, New Delhi.
5. Kumar, N., Manoj, R., Sachidananda, S.N., Gowda, H. and Jnanesh, A.C. (2014). Study the growth and flowering of gerbera genotypes under protected cultivation in Tumkur district of Karnataka-India. *Ann. Hort.*, **7** (1) : 78-84.
6. Kumar, R. (2014). Evaluation of chrysanthemum genotypes for flowering traits under open grown condition. *HortFlora Res. Spectrum.*, **3** (4) : 388-389.
7. Kumar, S., Srinivasa, V., Praneeth, Y.S., Jayasheela, D.S. and Gokavi, N. (2015). Evaluation of marigold genotypes for growth, yield and quality under hill zone of Karnataka. *Eco, Environ. Conser.*, **21**(4): 1743-1747.
8. Negi, R., Jarial, K., Kumar, S. and Dhiman, S. (2015). Evaluation of different cultivars of chrysanthemum suitable for low hill conditions of Himachal Pradesh. *J. Hill Agri.*, **6** (2) : 144-146.
9. Ona, A.F., Roni, M.Z.K., Ahmad, H. and Jamal Uddin, A.F.M. (2015). Study on growth and flower yield of five snowball varieties. *Bangladesh Res. Pub. J.*, **11** (3) : 182-186.

10. Pleog, A.V.D. and Hauvelink, E. (2006). The influence of temperature on growth and development of chrysanthemum cultivars: a review. *J. Hort. Sci. Biotech.*, **81** (2) : 174-178.
11. Rao, A.M. and Pratap, M. (2006). Evaluation of chrysanthemum (*Dendranthema grandiflora* Tzvelev). *J. Orn. Hort.*, **9** (2) : 221-223.
12. Sarmah, D., Kolukunde, S. and Mandal, T. (2014). Evaluation of gerbera varieties for growth and flowering under polyhouse in the plains of West Bengal, *Int. J. Sci. Res.*, **3** (12) : 135-136.
13. Singh, A., Patel, N.K. and Maiti, C.S. (2015). Performance of exotic gerbera cultivars grown under protected conditions in Nagaland. *Int. J. Farm Sci.*, **5** (3) : 98-101.
14. Singh, K.P., Prasad, V.K. and Raju, D.V.S. (2008). Evaluation of chrysanthemum (*Dendranthema grandiflora*) germplasm in winter season under Delhi condition. *J. Orn. Hort.*, **11** (1) : 58-61.
15. Singh, S., Kumar, R. and Poonam. (2008). Evaluation of chrysanthemum (*Dendranthema grandiflora* Tzvelev) open pollinated seedling for vegetative and floral characters. *J. Orn. Hort.*, **11** (4) : 271-274.
16. Srilatha, V., Kumar, S.K. and Kiran, D.Y. (2015). Evaluation of chrysanthemum varieties in southern zone of Andhra Pradesh. *Agri. Sci. Digest*, **35** (2) : 155-157.
17. Suma, V. and Patil, V.S. (2006). Flower quality parameters in Daisy (*Aster amellus* L.) genotypes. *Karnataka J. Agric. Sci.*, **19** (3) : 653-656.
18. Swaroop, K., Prasad, K.V. and Raju, D.V.S. (2008). Evaluation of chrysanthemum (*Dendranthema grandiflora* Tzvelev) germplasm in winter season under Delhi conditions. *J. Orn. Hort.*, **11** (1) : 58-61.
19. Talukdar, M.C., Mahanta, S., Sharma, B. and Das, S. (2003). Extent of genetic variation for growth and floral characters in chrysanthemum cultivars under Assam condition. *J. Orn. Hort.*, **6** (3) : 207-211.
20. Vasudevan, V. and Rao, V.K. (2010). Evaluation of gerbera genotypes under mid-hill conditions of Garhwal Himalayas, *J. Orn. Hort.*, **13**(3): 195-199.
21. Vetrivel, T. and Jawaharlal, M. (2014). Evaluation of chrysanthemum varieties for yield and quality under subtropical hills. *Trends Bio. Sci.*, **7**(14): 1812-1815.
22. Vidalie, H., Laffaire, M., Revere, L.M. and Charperitier, S. (1985). First results on the performance of gerbera cultivated on rockwool. *Revue Horticole*, **262** : 13-18.
23. Vikas, H.M., Patil, V.S. and Dorajeerao, A.V.D. (2015). Evaluation of Dahlia genotypes based on vegetative and quality characters. *Pl. Arch.*, **15** (1): 283-286.



Citation : Dewan N., Kumar S., Sharma S. and Chakraborty S. (2016). Evaluation of chrysanthemum (*Chrysanthemum morifolium* Ramat) genotypes under West Garo Hills District, Meghalaya. *HortFlora Res. Spectrum*, **5**(3) : 189-194.