Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2320-7051.5656

ISSN: 2320 – 7051

Int. J. Pure App. Biosci. **5 (4):** 1508-1512 (2017)

Research Article

International Journal of Pure & Applied Bioscience

OPEN ACCESS

Germplasm Evaluation of Chrysanthemum for Resistance to Aphid, *Macrosiphoniella sanbornii* (Gillette)

Saicharan M.[1*], Anitha V.[2], Srilatha D.[3] and Lalitha Kameshwari[4]

[1]Research Scholar, Department of Entomology and Agricultural Zoology, BHU, Varanasi

[2]Principal Scientist & Head, AINP on Pesticide Residues, PJTSAU, Rajendranagar, Hyderabad

[3]Associate Professor, Department of Entomology, PJTSAU, Rajendranagar, Hyderabad

[4]Scientist, Department of Horticulture, FRS, SKLTHU, Hyderabad

*Corresponding Author E-mail: munpally33@gmail.com

Received: 17.07.2017 | Revised: 26.07.2017 | Accepted: 28.07.2017

ABSTRACT

Chrysanthemum aphid Macrosiphoniella sanbornii (Gillette) is one of the serious pests of chrysanthemum. In order to find best suited resistant/ tolerant variety for the growing region and also to get to know the affinity between chrysanthemum flower colour and aphid incidence, 15no. of germplasm collections (5 red fowered, 5 white and another 5 yellow coloured) were screened at Floricultural Research Station Hyderabad. Among the five cultivars which recorded highest mean aphid population PAU-B-107, Ratlam selection were white flowered, Poonam, Raichur were yellow coloured cultivars and Akitha was red flowered. Similarly the five cultivars which recorded lowest aphid population count Redgold and Priya were red flower cultivars, IIHR-6, Kadapa local were white coloured and Aparjitha was the yellow coloured cultivar, from which it can be inferred that there was no clear affinity to colour by the aphids.

Key words: *Chrysanthemum, Gillette, Germplasm, Aphid.*

INTRODUCTION

Chrysanthemum (*Dendranthema grandiflora* Borkh) is one of the most beautiful flowering plant extolled to as Queen of the East. It is also known as "Autumn flower". Chrysanthemum (*Chryos* – golden, *anthos* - flower) ranks second to rose among top ten cut flowers in the world trade of flower crops preferred particularly for its range of shapes and size of flower, brilliant color tones and long lasting flower life[2]. In India it has been recognized as one among the five commercially important flower crops[4].

Profitable production of chrysanthemum is constrained by several factors, the most important being damage caused by insect pests and chrysanthemum aphid (*Macrosiphoniella sanborni* Gillette), Homoptera : Aphididae, causes direct damage through feeding and indirectly by sooty mold formation[1].

Cite this article: Saicharan, M., Anitha, V., Srilatha D. and Kameshwari, L., Germplasm Evaluation of Chrysanthemum for Resistance to Aphid, *Macrosiphoniella sanbornii* (Gillette), *Int. J. Pure App. Biosci.* **5(4):** 1508-1512 (2017). doi: http://dx.doi.org/10.18782/2320-7051.5656

Copyright © August, 2017; IJPAB

Winged adults of *M. sanbornii* are 2-2.5mm long, soft bodied and dark, shining mahagony brown. Wingless adults are 1-1.5mm length. Nymphs have dull, brick red bodies with relatively long legs and antenna. Both nymphs and adults suck sap from terminal buds, leaves, stem and flowers resulting in distorted growth. Chrysanthemum aphid is also reported to act as a vector of tomato aspermy cucumo virus (TAV) and Chrysanthemum B carlavirus[5]. Insecticides are the widely used means of controlling insect pests on chrysanthemum and their large scale, indiscriminate use lead to development of pest resistance and resurgence, besides adding to environmental pollution as well as cost of production. Pest control measures on floricultural crops including chrysanthemums should achieve near complete eradication because very low to zero damage is required for their commercial value[3].

Keeping in view, a sustainable and ecologically viable strategy is essential to combat insect pests and host plants meet these requirements. Therefore screening a large number of germplasm collections to identify the resistance sources is a pre-requisite for resistance breeding programme and helps farmers in selecting best suited resistant/ tolerant variety for the growing region.

MATERIALS AND METHODS

Relative incidence of aphids were recorded fortnightly on 15 promising cultivars among the germplasm collection at Floricultural Research Station, ARI, Rajendranagar, Hyderabad.

Three different coloured cultivars i.e. yellow, white and red were selected for evaluating the relative incidence of sucking insects. The fifteen cultivars selected are listed in Table 1

Table 1: Cultivars selected for evaluation of relative incidence of aphids

5 yellow flowered cultivars	5 white flowered cultivars	5 Red flowered cultivars
CO-3	PAU-B-107	Redgold
Geethanjali	IIHR-6	Akitha
Poonam	Kadapa local	Jaya
Aparjitha	Ratlam Selection	Priya
Raichur	White	Red stone

Each cultivar was transplanted on July 17th 2013 in 4 rows, each row of length 3m and intra row spacing of 20 cm. The spacing between rows was 30 cm. All the recommended agronomic practices were adopted except insecticidal sprays.

Number of aphids present on the top 10cm of apical shoot were recorded as and when it appeared on the terminals[6].

RESULTS AND DISCUSSION

The data on the mean aphid population recorded on apical shoot (top 10 cm) at fortnightly intervals (Table 2) indicated that the population of aphids differed significantly among 15 genotypes at all stages of observation.

Pre-flowering Period (Vegetative)

The mean number of aphids/apical shoot ranged between 26.1 to 34.1 in the pre flowering stage (2nd fortnight of August to 1st fortnight of October). Significant difference were observed between the different cultivars with reference to aphid incidence Red gold (26.1) < Priya (26.9), < IIHR 6 (27.5), Aparjitha (27.7), Kadapa local (27.7) < Red stone (28.1) < Geethanjali (28.8) < Co-3 (30.6), White (30.9) < Jaya (31.8) < Ratlam selection (32.2) < Akitha (32.5) < Raichur (32.7) < Poonam (33.5) < PAU-B-107 (34.1). Redgold recorded the least aphids population (26.1/apical shoot) while the highest aphid count was recorded in PAU-B-107 (34.1/apical shoot) (Table 3).

Flowering period (Reproductive)

During the flowering period (2nd fortnight of October to February), the aphid population ranged from 21.6 to 39.1/apical shoot among the different cultivars. The peak incidence was observed in the 2nd fortnight of December in

all the cultivars. The maximum number of aphids/apical shoot was recorded in PAU-B-107 (61 aphids/apical shoot) and the least in Redgold (32aphids/apical shoot). Incidence of rain (31.71mm) in the first fortnight of November resulted in a sudden decline in the population. That fortnight all the cultivars differed significantly in terms of the aphid load (Table 3). The mean number of aphids/apical shoot recorded in the different cultivars is as follows. Redgold < Priya < IIHR6, Kadapa Local < Aparijitha < Redstone < Geethanjali < CO-3 < White < Jaya < Ratlam selection < Akitha < Raichur < Poonam < PAU-B-107.

Redgold recorded the least aphid count (21.6 aphid/apical shoot) while PAU-B-107 had the maximum number (39.1 aphids/apical shoot). The abundance of aphids during this period can be attributed to the maximum availability of food in the form of buds and flowers.

Post flowering period (Senescence)

The population of the aphids was observed to decline during this period (second fortnight of February to second fortnight of March) as it coincided with close of flowering and the crop had reached senescence. The aphid population ranged between 3.9 to 9.6 aphids/ apical shoot during this period in the different cultivars. The mean aphid population varied in the different cultivars in the following order

Redgold, Priya < Aparjitha, IIHR-6 < Redstone < Kadapa local < Geethanjali < White < Jaya < Co3 < Raichur, Ratlam selection < PAU-B-107, Akitha, Poonam.

Table 2: Performance of different genotypes of chrysanthemum against *M. sanbornii* during *kharif* 2013-14

GENOTYPE	Average number of aphids per apical shoot														
	Pre flowering stage				Flowering stage							Post flowering stage			MEAN
	16-Aug	1-Sep	16-Sep	1-Oct	16-Oct	1-Nov	16-Nov	1-Dec	16-Dec	1-Jan	16-Jan	1-Feb	16-Feb	1-Mar	
	30 DAT	45 DAT	60 DAT	75 DAT	90 DAT	105 DAT	120 DAT	135 DAT	150 DAT	165 DAT	180 DAT	195 DAT	210 DAT	225 DAT	
CO3	26.9 (5.282)	29.1 (5.486)	30.1 (5.577)	36.1 (6.091)	34.7 (5.975)	4.1 (2.252)	32.8 (5.814)	39.4 (6.356)	39 (6.324)	31.2 (5.674)	24.3 (5.028)	13.6 (3.821)	8.3 (3.049)	2.8 (1.949)	25.17 (4.714)^{d}
PAU- B- 107	31 (5.657)	32.5 (5.788)	33.9 (5.908)	38.8 (6.309)	36.8 (6.148)	5.4 (2.528)	40.4 (6.434)	56.2 (7.563)	61 (7.874)	42.7 (6.611)	31.3 (5.683)	18.2 (4.381)	8.2 (3.033)	2.5 (1.87)	31.35 (5.241)^{i}
Redgold	20.5 (4.636)	23.7 (4.97)	27.8 (5.366)	32.2 (5.761)	29.4 (5.513)	2.0 (1.721)	19.6 (4.538)	30.7 (5.63)	32 (5.744)	20.1 (4.593)	17.7 (4.324)	9.1 (3.172)	2.6 (1.897)	0 (1)	19.10 (4.146)^{a}
Geethanjali	25.9 (5.186)	26.2 (5.214)	27.5 (5.338)	35.6 (6.05)	34.2 (5.932)	3.6 (2.143)	30.1 (5.577)	36.9 (6.156)	37.1 (6.172)	29.7 (5.541)	22.8 (4.878)	13.2 (3.768)	6.2 (2.683)	2.5 (1.871)	23.68 (4.579)^{c}
IIHR 6	22.6 (4.858)	25.9 (5.186)	27.7 (5.357)	33.7 (5.891)	32.3 (5.769)	4.0 (2.234)	22.2 (4.815)	30.2 (5.585)	33.6 (5.882)	23.8 (4.98)	20.9 (4.68)	10.3 (3.358)	5.2 (2.49)	0.9 (1.376)	20.95 (4.328)^{b}
Akitha	29.5 (5.522)	31.2 (5.674)	32 (5.744)	37.4 (6.196)	35.3 (6.024)	4.3 (2.302)	36 (6.082)	46.1 (6.863)	49.3 (7.092)	37.2 (6.18)	27.6 (5.347)	14.4 (3.923)	11.9 (3.591)	3.6 (2.145)	28.87 (4.982)^{fg}
Poonam	30.8 (5.639)	31.9 (5.735)	33 (5.83)	38.4 (6.277)	36.1 (6.09)	4.9 (2.428)	39.9 (6.395)	49.7 (7.12)	53.1 (7.355)	40.9 (6.473)	29.5 (5.522)	16.6 (4.195)	10.2 (3.346)	3.4 (2.097)	29.89 (5.118)^{h}
Kadapalocal	23 (4.897)^{a}	26 (5.196)	27.8 (5.366)	34.0 (5.916)	33.0 (5.831)	3.9 (2.212)	23.5 (4.948)	29.9 (5.559)	34.4 (5.95)	23.4 (4.939)	21.9 (4.785)	10.9 (3.449)	6.1 (2.664)	2.2 (1.789)	21.43 (4.365)^{b}
Jaya	28.8 (5.459)	29.6 (5.531)	31.6 (5.71)	37.1 (6.172)	35.0 (5.999)	4.8 (2.406)	34.1 (5.924)	43.4 (6.663)	43.3 (6.656)	35.3 (6.025)	26.6 (5.253)	14.0 (3.871)	9.2 (3.194)	1.3 (1.517)	26.72 (4.858)^{e}
Aparjitha	22.6 (4.857)	25.8 (5.177)	28.8 (5.459)	33.6 (5.882)	31.0 (5.656)	3.0 (1.993)	25.8 (5.176)	31.9 (5.735)	35.3 (6.024)	26.3 (5.225)	21.3 (4.722)	12.4 (3.661)	3.3 (2.074)	0 (1)	21.51 (4.387)^{b}
Ratlam selection	29 (5.476)	30.9 (5.648)	31.5 (5.701)	37.3 (6.189)	35.8 (6.066)	5.4 (2.529)	34.5 (5.958)	45 (6.782)	48.5 (7.035)	36.1 (6.091)	26.3 (5.224)	14.7 (3.962)	9.4 (3.225)	3.3 (2.074)	27.69 (4.933)^{ef}
Priya	22.1 (4.806)	25.5 (5.148)	26.8 (5.272)	33.3 (5.856)	31.9 (5.735)	3.4 (2.097)	21.9 (4.785)	30 (5.566)	31.7 (5.718)	20.6 (4.647)	19.2 (4.493)	9.7 (3.27)	2.9 (1.974)	0 (1)	19.93 (4.231)^{a}
Raichur	30.2 (5.585)	31.0 (5.657)	31.9 (5.735)	37.8 (6.229)	36.5 (6.123)	5.7 (2.588)	37.7 (6.221)	48.1 (7.007)	52.7 (7.328)	39.1 (6.332)	28.7 (5.449)	15.1 (4.012)	9.2 (3.194)	3.1 (2.024)	29.06 (5.05)^{gh}
White	27.6 (5.348)	29.6 (5.531)	30.4 (5.604)	36 (6.082)	33.9 (5.907)	4.2 (2.28)	33.6 (5.882)	41.6 (6.527)	41.9 (6.55)	32.9 (5.822)	25.6 (5.157)	13.5 (3.808)	7.2 (2.859)	2.2 (1.788)	25.73 (4.766)^{d}
Redstone	23.4 (4.939)	26.1 (5.205)	28.0 (5.385)	34.7 (5.975)	33.6 (5.881)	4.6 (2.365)	28.3 (5.412)	34.0 (5.916)	37.6 (6.212)	28.6 (5.441)	22 (4.795)	12.1 (3.618)	4.2 (2.28)	0.4 (1.178)	22.69 (4.497)^{c}
F-test	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig
SE(d)	0.086	0.032	0.033	0.036	0.06	0.069	0.039	0.046	0.063	0.031	0.045	0.071	0.065	0.045	0.041
C.D(P=0.05)	0.187	0.069	0.072	0.077	0.13	0.149	0.084	0.099	0.136	0.067	0.099	0.155	0.141	0.097	0.088

Figures in parantheses are $\sqrt{x+1}$ transformed values. Figures in columns followed by the same letter are not significantly different at 5% level

The overall mean population of aphids calculated from all the observations on the cultivars revealed that the genotype Red gold was least affected by aphids and recorded the lowest population of 19.10 aphids/apical shoot which was on par with Priya (19.93 aphids/ apical shoot). The genotypes IIHR-6, Kadapa local, Aparjitha recorded mean aphid population 20.95, 21.43 and 21.51/apical shoot which were on par with each other. Redstone and Geethanjali were on par with each other with an aphid population of 22.69 per apical shoot and 23.68 per apical shoot. The highest mean aphid population was recorded on PAU B 107 (31.35 aphids/ apical shoot) next higher infestation was found in Poonam (29.89 aphids/ apical shoot), closely followed by Raichur (29.06 aphids/ apical shoot) and Akitha (28.27 aphids/ apical shoot) which were on par with each other. The mean aphid population was found to be moderate in CO-3 (25.17 aphids/apical shoot) and White (25.73 aphids/apical shoot) both cultivars were on par with each other Jaya and Ratlam selection were on par with each other in terms of mean aphid population count which was found to be 26.72 and 27.69 aphids/ apical shoot respectively (Table 2).

Among the five cultivars which recorded highest mean aphid population PAU-B-107, Ratlam selection were white flowered, Poonam and Raichur were yellow coloured cultivars and Akitha was red flowered. Similarly the five cultivars which recorded lowest aphid population count Redgold and Priya were red flower cultivars, IIHR-6, Kadapa local were white coloured and Aparjitha was the yellow coloured cultivar. By observing the above results it can beinferred that there was no significant relation between flower colour of the cultivar and mean aphid infestation. However findings of the present study had established the existence of varietal variability and scope for resistance to aphid, *M. sanbornii* in chrysanthemum.

Table 3: Mean aphid population /apical shoot at preflowering, flowering and post flowering stages of chrysanthemum in *kharif* 2013-14 at FRS, Hyderabad

GENOTYPE	Mean aphid population/apical shoot at pre flowering stage	Mean aphid population/apical shoot at flowering stage	Mean aphid population/apical shoot at post flowering stage
CO3 (yellow)	30.6 (5.619)^{f}	29.4 (5.511)^{g}	8.2 (3.029)^{f}
PAU- B- 107 (White)	34.1 (5.922)^{k}	39.1 (6.33)^{n}	9.6 (3.252)^{h}
Redgold (red)	26.1 (5.202)^{a}	21.6 (4.749)^{a}	3.9 (2.202)^{a}
Geethanjali (yellow)	28.8 (5.456)^{e}	27.8 (5.363)^{f}	7.3 (2.876)^{e}
IIHR 6 (White)	27.5 (5.335)^{c}	23.9 (4.986)^{c}	5.5 (2.542)^{bc}
Akitha (red)	32.5 (5.785)^{hi}	33.7 (5.888)^{k}	10 (3.313)^{h}
Poonam (yellow)	33.5 (5.871)^{j}	36.3 (6.105)^{m}	10.1 (3.328)^{h}
Kadapalocal (White)	27.7 (5.354)^{c}	24.3 (5.026)^{c}	6.4 (2.714)^{d}
Jaya (red)	31.8 (5.724)^{g}	31.8 (5.724)^{i}	8.2 (3.026)^{f}
Aparjitha (yellow)	27.7 (5.352)^{c}	24.9 (5.085)^{d}	5.2 (2.482)^{b}
Ratlam selection (White)	32.2 (5.759)^{h}	33.1 (5.837)^{j}	9.1 (3.174)^{g}
Priya (red)	26.9 (5.279)^{b}	22.7 (4.864)^{b}	4.2 (2.27)^{a}
Raichur (yellow)	32.7 (5.803)^{i}	35.5 (6.039)^{l}	9.1 (3.174)^{g}
White (White)	30.9 (5.645)^{f}	30.5 (5.610)^{h}	7.6 (2.928)^{e}
Redstone (red)	28.1 (5.391)^{d}	27 (5.288)^{e}	5.6 (2.562)^{c}
CD	0.026	0.050	0.077
SE(d)	0.011	0.023	0.035

REFERENCES

1. Agrios, C.N., Plant Pathology. Academic Press, San Diego, California. **(3):** 379-390 (1988).
2. Brahma, B., Chrysanthemum when and how to grow? *Floriculture Today*. March-April: 30-32 (2002).
3. De Kogel, W.J., van der Hoek, M., van Dijken and Mollema, C., Variation in performance of western flower thrips populations on a susceptible and a partially resistant chrysanthemum cultivar. *Euphytica*. **103:** 181-186 (1998).
4. Janakiram, T., Mahantesh., Murgod, I and Prabhakar, B.S., Standardisation of agro techniques for production of chrysanthemum under low cost polyhouse. *Acta Horticulture*. **710:** 321-328 (2006).
5. Jaskiewicz, B., Gantner, M and Cisek, K., Chrysanthemum aphid. *Ochrona Roslin* **45(1):** 35-36 (2001).
6. Ramireddy, P.V. and Janakiram, T., Germplasm evaluation of chrysanthemum for resistance to aphid, *Macrosiphoniella sanbornii* (Gillette). *Journal of Ornamental Horticulture*. **7 (3-4):** 27-31 (2004).