

Effect of Rose (*Rosa gallica*) Flowers Color on the Infestation by the Rose Aphid, *Macrosiphum rosae* (Linnaeus)

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ABSTRACT

Experiments were carried out to study the effect of rose (*Rosa gallica*) flowers color on the infestation of adults and nymphs of the rose aphid, *Macrosiphum rosae* (Linnaeus), (Aphididae, Hemeptera). Using five varieties of rose similar in the horticulture characters but different in the flowers color only. Carmen (red), Virginia (white), Freedom (yellow), Queen (blue) and Dream (pink) Experiments were done in two locations El-Orman Garden, Giza Governorate and International Garden, Cairo Governorate throughout 2015 season. In both Governorates (Giza and Cairo), the infestation with the rose aphid adults began to appear on the 1st February and recorded the activity peak during April then decreased until beginning of August. The flowers color of *R. gallica* may arrange for attracted the rose aphid adults, as follow: yellow, red, blue, pink and white, respectively. Statistical analysis showed that highly significant differences between the five flowers color (varieties) of *R. gallica* on the attraction of adults of the rose aphid, *M. rosae*. In the same trend, the infestation with the rose aphid nymphs began to appear on February and increase gradually lasting to the first pike in April, then the population began decreased until beginning of August. It can be arranging the flowers color of *R. gallica* for attract of the rose aphid (nymphs) as follows: yellow, red, blue, pink and white. Statistical analysis showed that highly significant differences between the five flowers color (varieties) of *R. gallica* on the attraction of *M. rosae* nymphs.

INTRODUCTION

Rose (*Rosa gallica*) is one of the important ornamental plants in Egypt and around all over the world. So it named king of flowers. It's found from oldest countries, rose is the favorite flower for human in the world wide, whereas, developing live and highly technology but still and increase love human to roses. , the human love for the roses due to their beautiful colors , style of flowers, smiles, and tolerant the inferable weather factors. Later became one of the important components for increase income for many countries all over the world, which exporting these roses to different countries, Baydar(2004) . *Rosa gallica* is a low shrub with extensive runners and above ground reed like shoots, which are erect and branched. They usually grow to between 0.5 to 1 m and are covered with long revolute, (Gruenwald *et al.*, 2007). Aphids, as an important group of insects which are belonged to order Hemiptera, are very successful creatures with the most species diversity in temperate regions and worldwide distribution. *Macrosiphum rosae* L., commonly known as rose aphid, is an important pest of rose and many other crops. The adults and nymphs of aphid attack the rose plants and suck cell sap from flowers, tender shoots and buds, ultimately decreasing the market value of rose flowers. Aphid infestation badly affects the flowering capacity of plants, resulting in 20-40% losses. The aphids are apterous and reproduce parthenogenetically. Aphid populations may increase very rapidly under natural conditions (Gilkesson and Kelin 2001), Islam (2007) and Ashraf (2009).

The aim of this work is study the effect of five colors of rose Carmen (red), Virginia (white), Freedom (yellow), Queen (blue) and Dream (pink) on the attraction of adults and nymphs of rose aphid, *M. rosae*.

MATERIALS AND METHODS

The present investigation includes the effect of flowers colors of rose (*R. gallica*) on the attraction of

rose aphid, *M. rosae* during season 2015 in El-Orman Garden, Giza Governorate and International Garden, Cairo Governorate.

Experimental design:

This study was conducted on five varieties of rose (*R. gallica*) Carmen (red), Virginia (white), Freedom (yellow), Queen (blue) and Dream (pink) which grown in El-Orman Garden and International Garden during 2015 season. Rose varieties (colors) were cultivated in the same time in a timely manner for the cultivation of seedlings roses in November. And in a same area, which were three plots for each variety (color). The area of each plot was 3x5m, these area was completely isolated in the two parks,. Then it was conducted all agricultural operations in a manner quite similar in the two parks. The normal and recommended agricultural practices were applied, also no chemical control against insects were used during the whole experimental period.

With note the degree of infestation of flowers with aphid in various stages of plants. It is proven accurate observations of the infestation with aphid of roses and there are very slight differences and ineffective in vegetative growth stages of plants, all in the two localities of the study, but when it seemed the appearance of flowers of different colors seemed remarkable difference in the infestation with aphid. Directly counting was done weekly during the duration of the presence of flowers from February until August.

It observed that the weekly counting and monthly averages the aphid insect preference of the colors on the following order: yellow, red, blue, pink and white.

Statistical analysis:

In the experiments, the effect of five flowers colors (varieties) of *R. gallica* on the attraction of individuals of the rose aphid, *M. rosae* were subjected to analysis of variance (ANOVA) and the means were compared by L.S.D. test at 0.05 level, using SAS program (SAS Institute, 1988).

RESULTS AND DISCUSSION

In this work five flowers colors (varieties) of *R. gallica* Carmen (red), Virginia (white), Freedom (yellow), Queen (blue) and Dream (pink) were tested for study the effect of flowers color on the attraction of adults and nymphs of the rose aphid, *M. rosae*.

In Giza Governorate, the infestation with the rose aphid adults began to appear on the 1st February with 5.4 adults/flower, then the infestation increased gradually to reach 20.7 adults/flower (activity peak) on the 1st April then the infestation decreased until reached to 2.0 adults/flower on beginning of August. The total number of adults of the rose aphid variety was 159.5 adults in case yellow flowers of *R. gallica* (most

attraction) with 33.9% (Table 1) and (Fig. 1). After that the red color flowers came the next one for attraction the rose aphid with total number 105.5 adults (22.4%) and also the activity peak on the beginning of April with mean number 16.2 adults/flower. Where as, in the third category the blue flower color came after that with total number 82.0 adults (17.4%) and also the activity peak on the beginning of April with mean number 10.4 adults/flower. On the other hand, pink came in the fourth category with total number 67.7 adults (14.4%) and the activity peak on the mid of March with mean number 11.1 adults/flower. Finally the white color came the last one with total number 55.7 adults (11.8%) and also the activity peak on the mid of March with mean number 9.8 adults/flower.

Table (1): The mean numbers of adults and nymphs of the rose aphid, *M. rosae* attraction with different flowers colors of *R. gallica* in Giza Governorate.

Date	Yellow		Red		Blue		Pink		White	
	A	N	A	N	A	N	A	N	A	N
1/2/2015	5.4	15.4	3.1	9.7	3	8.4	2.8	8.1	1.9	5.3
15/2/2015	11.1	25.4	9.8	18.7	8.1	15.9	7.5	14.1	6.7	9.7
1/3/2015	15.6	35.1	14.1	27.4	11.5	19.7	9.6	15.8	8.1	11.9
15/3/2015	18.1	41.8	15.9	30.5	12.7	25.4	11.1	17.1	9.8	12.1
1/4/2015	20.7	33.4	16.2	27.1	10.4	19.1	10.1	16.2	8.1	14.1
15/4/2015	17.4	29.8	11.6	25.4	9.8	15.4	7.6	13.8	6.8	10.4
1/5/2015	16.9	26.4	9.8	20.1	8.2	11.7	5.1	12.6	4.2	9.1
15/5/2015	15.1	23.5	8.7	17.5	6.5	10.2	4.3	9.7	3.1	5.2
1/6/2015	13.8	19.8	6.5	11.7	5.2	9.7	3.8	8.1	2.8	4.8
15/6/2015	11.6	16.1	4.2	9.4	3.4	8.7	3.2	4.5	2.1	3.1
1/7/2015	8.1	15.8	3.1	5.3	1.7	5.9	1.8	2.9	1.3	1.7
15/7/2015	3.7	10.7	1.4	3.2	0.9	2.6	0.6	2.1	0.5	0.9
1/8/2015	2	5.4	1.1	0.9	0.6	0.8	0.2	0.6	0.3	0.5
Total	159.5	298.6	105.5	206.9	82	153.5	67.7	125.6	55.7	88.8
%	33.9	34.2	22.4	23.7	17.4	17.6	14.4	14.4	11.8	10.2

A: Adult
N: Nymph

Jaskiewicz (1997) reported that the rose aphid *M. rosae* was found to be most abundant on *Rosa rugosa* than *R. canina*. Strong infestation by the aphid resulted in the flowers.

It can be arranging the flower colors of *R. gallica* for attracting of the rose aphid (adults) as follows: yellow, red, blue, pink and white.

Statistical analysis in (Fig. 1) showed that highly significant differences between the five flowers colors (varieties) of *R. gallica* (yellow, red, blue, pink and white) on the attraction of adults of the rose aphid, *M. rosae* ($F = 461.99$ & $L.S.D. 0.05 = 1.914$).

The obtained results are agreed with those recorded by Ibrahim (1997), who found that sticky yellow trap catching the highest number of aphids on potato and dominated the corresponding number captured of aphids by water pan trap. On the other hand, Hoback *et al.* (1999) studied the effect of color (yellow or blue) and placement (exposed or shaded) of sticky traps on leafhopper on cotton fields and diversity estimates. The results showed that more leafhopper was collected on shaded traps. The yellow color was more suitable for trapping.

In case aphid nymphs, the infestation with the rose aphid nymphs began to appear on the 1st February

with 15.4 nymphs/flower, then the infestation increased gradually to reach 41.8 nymphs/flower (activity peak) on mid March then the infestation decreased reached to 5.4 nymphs/flower on beginning of August. The total number of nymphs of the rose aphid variety was 298.6 nymphs in case yellow flowers of *R. gallica* (most attraction) with 34.2% (Table 1 and Fig. 2). After that the red color flowers came the next one for attraction the rose aphid with total number 206.9 nymphs (23.7%) and also the activity peak on the mid March with mean number 30.5 nymphs/flower. Where as, in the third category the blue flower color came after that with total number 153.5 nymphs (17.6%) and also the activity peak on the mid of March with mean number 25.4 nymphs/flower. On the other hand, pink came in the fourth category with total number 125.6 adults (14.4%) and the activity peak on the mid of March with mean number 17.1 nymphs/flower. Finally the white color came the last one with total number 88.8 nymphs (10.2%) and also the activity peak on the beginning of April with mean number 14.1 nymphs/flower.

It can be arranging the flower colors of *R. gallica* for attract of the rose aphid (nymphs) as follows: yellow, red, blue, pink and white.

Color of flowers	Yellow	Red	Blue	Pink	White
Mean numbers	159.5 ^a	105.5 ^b	82.0 ^c	67.7 ^d	55.7 ^e
%	33.9	22.4	17.4	14.4	11.8
F _{0.05}			461.99		
LSD			1.91		

Means within columns bearing different subscripts are significantly different (P < 0.05)

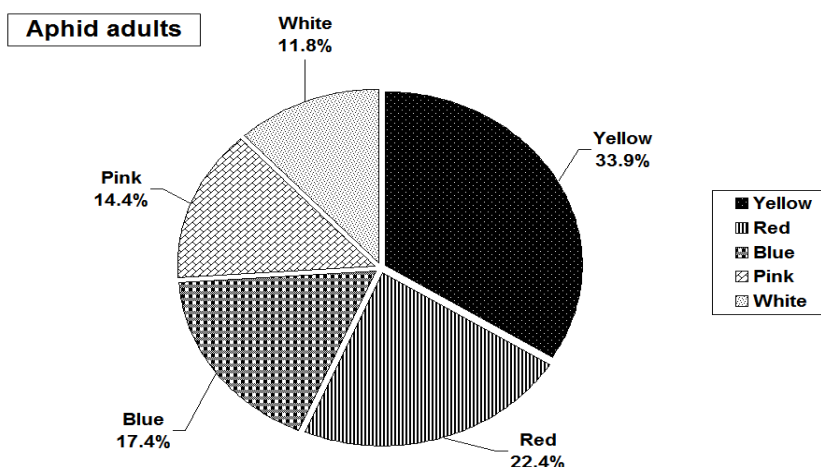


Fig. (1): Efficiency of various flowers colors of *R. gallica* for attracting adults of the rose aphid, *M. rosae* in Giza Governorate during 2015 season.

Statistical analysis in (Fig. 2) showed that highly significant differences between the five flowers colors (varieties) of *R. gallica* (red, white, yellow, blue and pink) on the attraction of nymphs of the rose aphid, *M. rosae* (F = 146.36 & L.S.D. 0.05= 6.85).

Labonne *et al.* (1989) compared three kinds of traps for catching alate aphids flying near the canopy of grassland, 55000 individuals representing 93 species (or species groups) were taken. Samples taken in sticky thread traps and suction traps were very similar, but those in yellow water pan traps gave fewer numbers of the abundant species only.

Sticky thread traps could be used instead of suction traps to study aphid flying near the vegetation canopy. Whereas, Chu *et al.* (2000) in USA, reported that lime green, bellow and spring green were the three most attractive trap base colors for silver leaf whitefly. *Bemisia argentifolii* Bellows & Perring and leafhopper *Empoasca* spp. adults. The three trap base colors were moderately high in the green, yellow and orange spectral region (490-600 nm) resembling the spectral reflectance curve of the abaxial (under leaf) surfaces of green cotton leaves.

Color of flowers	Yellow	Red	Blue	Pink	White
Mean numbers	298.6 ^a	206.9 ^b	153.5 ^c	125.6 ^d	88.8 ^e
%	34.2	23.7	17.6	14.4	10.2
F _{0.05}			146.36		
LSD			6.85		

Means within columns bearing different subscripts are significantly different (P < 0.05)

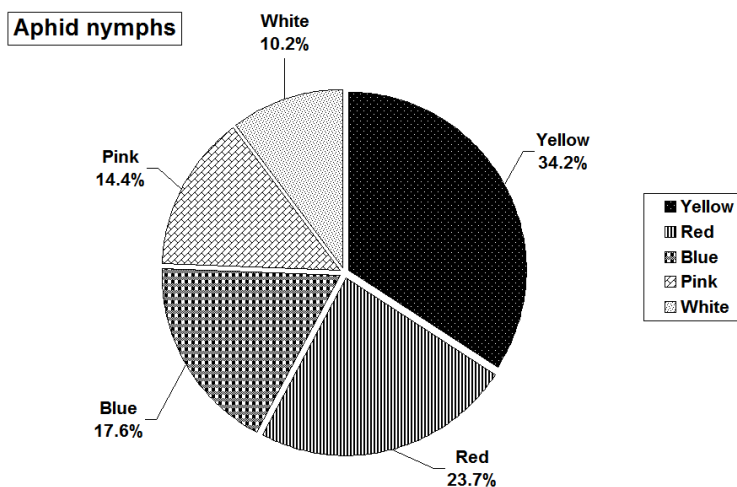


Fig. (2) : Efficiency of various flowers colors of *R. gallica* for attracting nymphs of the rose aphid, *M. rosae* in Giza Governorate during 2015 season.

In Cairo Governorate, the infestation with the rose aphid adults began to appear on the 1st February with 3.1 adults/flower, then the infestation increased gradually to reach 15.4 adults/flower (activity peak) on the 1st April then the infestation decreased reached to 1.1 adults/flower on beginning of August. The total number of adults of the rose aphid variety was 101.1 adults in case yellow flowers of *R. gallica* (most attraction) with 34.9% Table (2) and Fig. (3). After that, the red colour flowers came the next one for attraction the rose aphid with total number 70.4 adults (24.3%) and also the activity peak on the beginning of April with mean number 11.4 adults/flower. Whereas, in the third category the blue flower color came after that with total number 48.7 adults (16.8%) and also the activity peak on the beginning of April with mean number 9.1 adults/flower. On the other hand, pink came in the fourth category with total number 39.5 adults (13.6%) and the activity peak on the beginning of April with

mean number 8.6 adults/flower. Finally the white color came the last one with total number 29.7 adults (10.3%) and also the activity peak on the beginning of April with mean number 5.6 adults/flower.

Can be arranging the flower colors of *R. gallica* for attract of the rose aphid (adults) as follows: yellow, red, blue, pink and white.

Statistical analysis in (Fig. 3) showed that highly significant differences between the five flowers colors (varieties) of *R. gallica* (yellow, red, blue, pink and white) on the attraction of adults of the rose aphid, *M. rosae* (F = 881.6 & L.S.D. 0.05= 0.96).

Gahukar (2003) investigated the factors affecting thrips (*Scirtothrips dorsalis* and *Thrips flavus*) abundance and distribution on rose flowers. It was founds the thrip number significantly varied with the level of flower infestation, flower color, compactness, size and petal position. Thrips preferred loose, small-sized and red-orange colored flowers.

Table (2): The mean numbers of adults and nymphs of the rose aphid, *M. rosae* attraction with different flowers colors of *R. gallica* in Cairo Governorate.

Date	Yellow		Red		Blue		Pink		White	
	A	N	A	N	A	N	A	N	A	N
1/2/2015	3.1	12.9	2.5	7.3	2.1	6.9	1.5	5.7	1.2	4.3
15/2/2015	8.7	18.4	5.2	13.8	3.4	10.8	2.9	8.7	2.1	6.9
1/3/2015	11.2	29.4	9.7	15.3	6.8	15.7	5.4	12.4	3.2	10.8
15/3/2015	13.4	31.8	10.6	17.2	7.8	13.1	5.7	9.7	4.9	7.7
1/4/2015	15.4	20.4	11.4	18.3	9.1	12.9	8.6	9.1	5.6	6.7
15/4/2015	12.1	22.1	9.7	16.5	6.8	11.1	5.1	8.7	4.8	5.3
1/5/2015	11.2	17.4	8.4	12.8	5.2	8.4	4.3	6.7	3.8	4.7
15/5/2015	8.7	14.3	6.1	8.7	4.1	5.2	3.2	4.9	2.5	3.1
1/6/2015	6.5	11.2	4.3	6.4	1.9	3.7	1.8	3.1	1.2	2.5
15/6/2015	4.2	9.7	1.2	5.1	1	2.9	0.9	2.1	0.4	1.8
1/7/2015	3.9	8.1	0.9	4.6	0.3	1.8	0.1	1.2	0	1.1
15/7/2015	1.6	6.2	0.3	2.9	0.2	0.6	0	0.5	0	0.3
1/8/2015	1.1	3.4	0.1	1.8	0	0.1	0	0	0	0
Total	101.1	205.3	70.4	130.7	48.7	93.2	39.5	72.8	29.7	55.2
%	34.9	36.8	24.3	23.5	16.8	16.7	13.6	13.1	10.3	9.9

A: Adult
N: Nymph

In case aphid nymphs, the infestation with the rose aphid nymphs began to appear on the 1st February with 12.9 nymphs/flower, then the infestation increased gradually to reach 31.8 nymphs/flower (activity peak) on mid March then the infestation decreased reached to 3.4 nymphs/flower on beginning of August. The total number of nymphs of the rose aphid variety was 205.3 nymphs in case yellow flowers of *R. gallica* (most attraction) with 36.8% Table (2) and Fig.(3). After that the red colour flowers came the next one for attraction the rose aphid with total number 130.7 nymphs (23.5%) and also the activity peak on the beginning of April with mean number 18.3 nymphs/flower. Whereas, in the third

category the blue flower color came after that with total number 93.2 nymphs (16.7%) and also the activity peak on the beginning of March with mean number 15.7 nymphs/flower. On the other hand, pink came in the fourth category with total number 72.8 adults (13.1%) and the activity peak on the beginning of March with mean number 12.4 nymphs/flower. Finally the white color came the last one with total number 55.2 nymphs (9.9%) and also the activity peak on the beginning of March with mean number 10.8 nymphs/flower.

Can be arranging the flower colors of *R. gallica* for attract of the rose aphid (nymphs) as follows: yellow, red, blue, pink and white.

Color of flowers	Yellow	Red	Blue	Pink	White
Mean numbers	101.1 ^a	70.4 ^b	48.7 ^c	39.5 ^d	29.7 ^e
%	34.9	24.3	16.8	13.6	10.3
F _{0.05}	881.6				
LSD	0.96				

Means within columns bearing different subscripts are significantly different (P< 0.05)

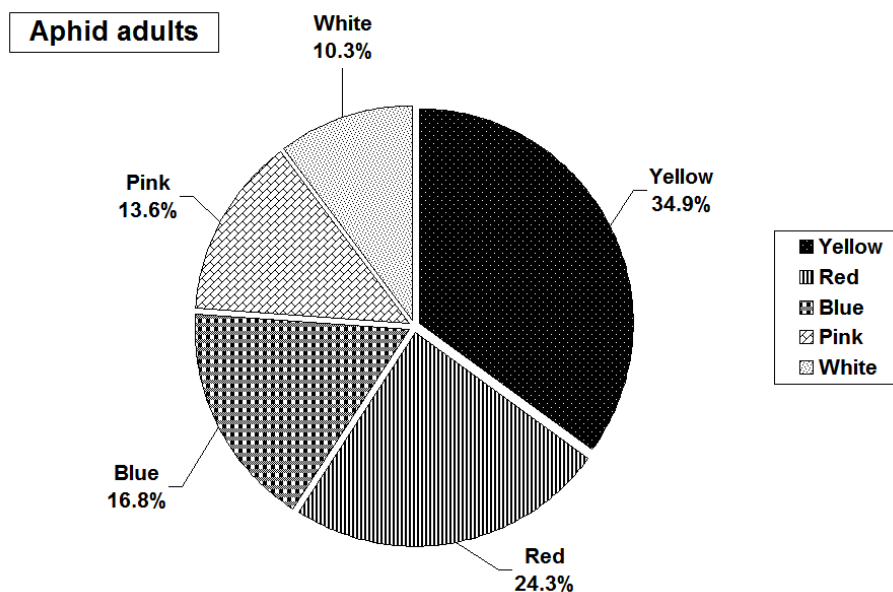


Fig. (3): Efficiency of various flowers colors of *R. gallica* for attracting adults of the rose aphid, *M. rosae* in Cairo Governorate during 2015 season.

Statistical analysis in (Fig. 4) showed that highly significant differences between the five flower colors (varieties) of *R. gallica* (yellow, red, blue, pink and white) on the attraction of adults of the rose aphid, *M.*

rosae ($F = 114.4$ & L.S.D. $0.05 = 1.75$).

Generally, the infestation with the rose aphid (adults and nymphs) in Giza Governorate recorded greater numbers than in Cairo Governorate.

Color of flowers	Yellow	Red	Blue	Pink	White
Mean numbers	205.3 ^a	130.7 ^b	93.2 ^c	72.8 ^d	55.2 ^e
%	36.8	23.5	16.7	13.1	9.9
$F_{0.05}$	114.4				
LSD	1.75				

Means within columns bearing different subscripts are significantly different ($P < 0.05$)

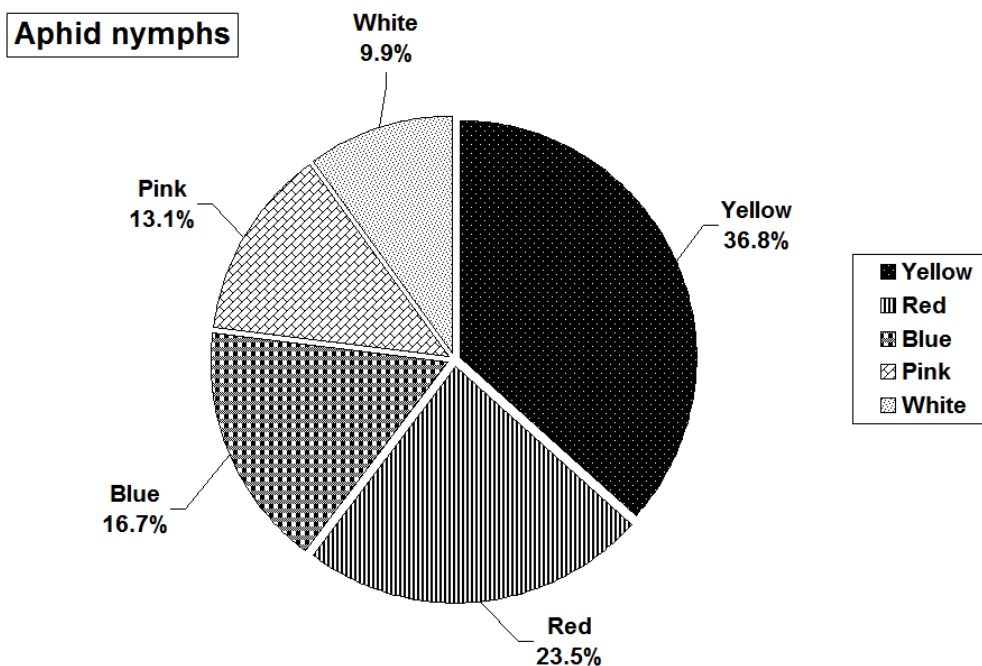


Fig. (4): Efficiency of various flowers colors of *R. gallica* for attracting nymphs of the rose aphid, *M. rosae* in Cairo Governorate during 2015 season.

Fereres et al. (1999) found that *Myzus persicae* (Sulzer) and *Rhopalo siphummaidis* (Fitch) preferred alighting on intensely (highly saturated) yellow than on green (plant-like) or brown (soil-like) ceramic tiles, and expressed no preference for landing on leaves infected with soybean mosaic virus (SMV) or on chlorophyll-deficient soybean leaves.

REFERENCES

- Ashraf, S. E. (2009): Effect of insect infestation on some rose plants. Ph.D. Thesis, Fac. Agric., Al-Azhar Univ., Cairo, Egypt.
- Baydar, H. (2004): The cultivation of the oil producing rose and the rose oil industry in Turkey Turktarm, (160): 54-57.
- Chu, C. C.; T. J. Pinter; K. Henneberry; K. Umeda; E. T. Natwich; Y. A. Wel; V. R. Reddy and M. Shrepatis (2000): Use of C.C. Traps with different base color for silver leaf whiteflies (Homoptera : Aleyrodidae) and leafhoppers (Homoptera : Cicadellidae). J. Econ. Entomol., 93 (4): 1329-1337.
- Fereres, A.; Kampmeier, G. E. and Irwin, M. E. (1999): Aphid Attraction and Preference for Soybean and Pepper Plants Infected with Potyvirus. DOI: <http://dx.doi.org/10.1093/aesa/92.4.542> 542-548 First published online: 1 July 1999.
- Gahukar, R. T. (2003): Factors influencing thrips abundance and distribution on rose flowers in central India. J. Entomol. Res., 27(4): 271-279.
- Gilkeson, L. and Kelin, M. (2001): Natural enemies of insect pests. Ext Cornell Univ Ithea NY 2001, 63.
- Hoback, W. W.; T. M. Savatos; S. M. Spomer and S. G. Higley (1999): Trap color and placement affects estimates of family level abundance and diversity in Nebraska, Saltmarch, Ento. Exper. E Appl., 92: 393-402.
- Ibrahim, M. Y. (1997): Biological and ecological studies on some potato pests. M. Sc. Thesis, Fac. Agric. Ain-Shams Univ., 271 pp.
- Islam, M.H. (2007): Biology and predation efficiency of lady birdbeetle *Menochilus sexmaculatus* (F.) M. S. (Entomology) Thesis, Department of Entomology, HSTU, Dinajpur, 2007, 2.
- Jaskiewicz, B. (1997): Observations on the occurrence on the rose aphid (*Macrosiphum rosae* L.) on bushes of *Rosa rugosa* Thunb. and *R. canina* L. Folia Horticulturae, 9(1): 25-31.
- Labonne, G. F.; F. Lauriat and J. Quiot (1989): Comparison of three types of trap for sampling populations of alate aphids. Agronomy, 9 (6): 547-557.
- SAS Institute (1988): SAS/STAT User's Guide, Ver. 6.03. SAS Institute Inc., Cary, North Carolina.

تأثير لون أزهار الورد *Rosa gallica* علي الإصابة بحشرة من الورد *Macrosiphum rosae* أشرف صلاح إمام ، فرحة حسنى حسن فرج الله و سامية منذر ابو زيد معهد بحوث وقاية النباتات - مركز البحوث الزراعية- الدقي - الجيزة - ١٢٦١٨ مصر

تم إجراء التجارب بغرض دراسة تأثير الألوان المختلفة لأزهار الورد *Rosa gallica* (الحمراء، البيضاء، الصفراء، الزرقاء، الوردية أو البيّنك) علي جذب والإصابة بحشرة من الورد *Macrosiphum rosae* حيث تم إجراء هذه الاختبارات بحديقة الأورمان بمحافظة الجيزة والحديقة الدولية بمحافظة القاهرة على مدار الموسم الزراعي لعام ٢٠١٥. وأشارت النتائج الى انه في كل من حديقة الأورمان بمحافظة الجيزة والحديقة الدولية بمحافظة القاهرة أن الإصابة بالحشرات الكاملة والحوريات لحشرة من الورد بدأت في الظهور بداية من زراعة الشتلات في شهر نوفمبر على المجموع الخضري وذلك بصورة متقاربة الى حد كبير بين الألوان (الأصناف) المختلفة. ولكن بداية من ظهور الأزهار في شهر فبراير ظهر الاختلاف بوضوح في درجة او شدة الإصابة بين الألوان (الأصناف) المختلفة. وظهر لهذا النوع من المن قمة نشاط في شهر أبريل ثم قلت الإصابة بعد ذلك حتى بداية شهر أغسطس. ويمكن ترتيب إنجذاب الأفراد الكاملة لمن الورد علي حسب لون الأزهار كالتالي: الأزهار الصفراء، الحمراء، والزرقاء والبيّنك ثم البيضاء، علي الترتيب. وفي نفس السياق وجد أن الإصابة بحوريات من الورد بدأت في الظهور بداية من شهر فبراير علي الأزهار وظهر لهذا النوع من المن قمة نشاط في شهر أبريل ثم قلت الإصابة بعد ذلك حتى بداية شهر أغسطس. ويمكن ترتيب إنجذاب الأفراد الغير كاملة (الحوريات) لمن الورد علي حسب لون الأزهار كالتالي: الأزهار الصفراء، الحمراء، والزرقاء، البيّنك ثم البيضاء، علي الترتيب. كما أوضح التحليل الإحصائي للنتائج وجود فروق معنوية عالية بين الألوان المختلفة لأزهار النباتات في جذبها للمن. أيضا أوضحت الدراسة أن درجة الإصابة بحشرة المن تتركز في حديقة الأورمان بمحافظة الجيزة بدرجة أكبر نسبيا من الحديقة الدولية بمحافظة القاهرة.