

## EFFECT OF INSECT INFESTATION ON THE MORPHOLOGICAL CHARACTERS OF SOME ROSE VARIETIES

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### ABSTRACT

Experiments were carried out to study the effect of infestation by *Macrosiphum rosae* (L.) and *Frankliniella occidentalis* (Pergande) on the morphological characters of eight rose varieties (four local var. and four import var.). Experiments were done in El-Orman garden, Giza Governorate throughout two years (2004 and 2005). Results indicated that the all the morphological characters (colour of the flower, number of the petals per flower, the flower diameter, weight of the flower, the stem length, colour of the leaves, vase life and annual production) were reduced after infestation by the two pests. The effect of *M. rosae* was higher than the effect of *F. occidentalis*, the results also indicated that the infestation by the two insects concentrated on the vascular bundles and barynshema in the tissue of the rose petals and occurs damage in these parts.

### INTRODUCTION

The rose ( *Rosa spp.*, Fam. Rosaceae ) is the most important cut flowers throughout the world . It's found from oldest centuries, the rose is the favorite flowers for human in the world wide. Whereas, developing live and highly technology but still and increase love man to roses. The roses are growing all over the world, the humane love to the roses due to their beautiful colours, style of the flowers, smiles, and tolerant the inferable weather factors.

Roses became the important ornamental plants in Egypt and around the world. It's growing for decorations, perfume extractions, medical purposes, and nutrition industries. Later became one of the important components for increase income for our country, which exporting these roses to Arabian and European countries , Baydar ( 2004 ), in Turkey, different insect pests are attacking roses, which cause a great damage lead to reducing its quality and quantity , Kmiec ( 2007 ) in Poland and Liang *et al.* (2007) in China .

The purpose of this work is studying the effect of the insect infestation by *Macrosiphum rosae* (L.) and *Frankliniella occidentalis* ( Pergande ) on the morphological characters of certain rose varieties .

### MATERIALS AND METHODS

The present study was conducted on eight rose varieties (four local var. and four imported var.) in El-Orman garden, Giza Governorate throughout two years (2004 and 2005 ). Local rose varieties were, Cinderella

(red), Bianca ( yellow ) , *Rosa gallica* (pink) and Lambada (white) . Imported rose varieties were Carmen (red), Golden gate (yellow), Dream (pink) and Virginia (white).The morphological characters including : colour of the flower , number of the petals per flower , the flower diameter , weight of the flower , the stem length , leaves , vase life and annual production . The test – area (135 m<sup>2</sup> for each variety) was divided into 9 plots ( 3 x 5 m<sup>2</sup> each ) , each contain 25 plants , The plots were arranged in randomized block with three replicates for each treatment , and another three replicates as control . The first treatment was infested artificially with aphids, the second was infested artificially with thrips and the third was left as control . The average of 15 plants (5 plants from each replicate) was calculated for each character, while annual production was calculated by averaged for all plots.

**Statistical analysis:**The effect of the insect infestation by *M. rosae* and *F. occidentalis* on the morphological characters of certain rose varieties were subjected to analysis of variance ( ANOVA ) and the means were compared by LSD test at .05 level , using SAS program ( SAS institute , 1988 ) .

## RESULTS AND DISCUSSION

Data in Table (1) show the effect of infestation by two insects (*M. rosae* and *F. occidentalis*) on the morphological characters of local rose varieties , for (Cinderella variety) , the colour changed from cardinal red in control , to red as a result of infestation by the two insects . Petals containing 25-30 petals / flower in control, whereas containing 15-20 and 20-25 petals / flower after infestation by aphid and thrips, respectively, statistical analysis in Table (1) show non-significant differences between the infestation by the two insects compared with control. The flower diameter changed from 10-12 cm in control to 6-8 and 8-10 cm after infestation by aphid and thrips, respectively, (significant differences in the flower diameter between the infestation by the two insects compared with control) . Weight of the flower also decreased from 20-22 g in control to 16-18 and 17-19 g after infestation by aphid and thrips, respectively, (significant differences in weight of the flower between the infestation by the two insects compared with control) .The stem length decreased from 70-80 in control to 40-45 and 50-60 cm after infestation by aphid and thrips, respectively, (highly significant differences in the stem length between the infestation by the two insects compared with control ) . The size and colour of the leaves also changed, which were very large and light green in control to large and light green after infestation by aphid and thrips. The vase life decreased from 8-10 days in control to 5-6 and 6-8 days after infestation by aphid and thrips, respectively, (significant differences in the vase life between the infestation by the two insects compared with control).Finally, the annual production reached to 110-120 flower/m<sup>2</sup>/year in control, but decreased to 70-80 and 90-100 flower/m<sup>2</sup>/year after infestation by aphid and thrips, respectively,(highly significant differences between the infestation by the two insects compared with control).

For (Bianca variety), the colour not changed after infestation by the two insects.

**Table 1: Effect of infestation by aphid and thrips on the morphological characteristics of local rose varieties.**

Adjective	Cinderella			SA	Bianca			SA	Rose gallica			SA	Lambada			SA
	Control	Aphid	Thrips		Control	Aphid	Thrips		Control	Aphid	Thrips		Control	Aphid	Thrips	
Colour	Cardinal red	Red	Red	-	yellow	yellow	yellow	-	pink	pink	pink	-	White	White	white	-
No. of Petals/flower	25-30	15-20	20-25	F = 3.62 <sup>ns</sup> LSD = 7.08	25-30	15-20	20-25	F = 11.07** LSD = 5.03	25-30	15-20	20-25	F = 7.08* LSD = 5.92	30-40	15-20	20-25	F = 19.81** LSD = 7.08
Flower diameter/cm	10-12	6-8	8-10	F = 12.01** LSD = 1.99	9-11	5-7	7-8	F = 16.00** LSD = 1.76	10-12	6-8	8-10	F = 12.01** LSD = 2.0	8-10	4-6	5-7	F = 13.01** LSD = 1.99
Weight/g	20-22	16-18	17-19	F = 13.01** LSD = 1.98	18-20	15-17	16-18	F = 7.03* LSD = 1.99	15-17	11-13	13-15	F = 12.01** LSD = 1.97	17-19	13-15	15-17	F = 12.01** LSD = 1.88
Stem length/cm	70-80	40-45	50-60	F = 42.54*** LSD = 8.66	40-50	25-30	30-35	F = 6.71* LSD = 9.72	60-70	40-50	50-60	F = 12.00** LSD = 9.98	50-60	30-40	40-50	F = 12.0*** LSD = 9.99
Leaves	Very large and light green	Large and green	Large and green		Large and light green	Large and green	Large and green		Very large and light green	Large and green	Large and green		Large and green	Large and green	Large and green	
Vase life/day	8-10	5-6	6-8	F = 10.86* LSD = 1.76	8-10	5-6	6-8	F = 13.01** LSD = 1.76	7-9	4-6	5-7	F = 7.03* LSD = 1.98	5-7	3-4	4-5	F = 7.4* LSD = 1.49
Annual production flower/m <sup>2</sup> year	110-120	70-80	90-100	F = 48.00*** LSD = 9.89	120-140	80-90	100-110	F = 26.74** LSD = 14.51	90-110	50-60	70-80	F = 30.5*** LSD = 14.13	110-130	70-90	90-110	F = 12.01** LSD = 19.97

SA = Statistical analysis

\* - significant

\*\*\* - high significant

ns - non significant

\*\* - significant

Petals containing 25-30 petals / flower in control, whereas containing 15-20 and 20-25 petals / flower after infestation by aphid and thrips, respectively, (significant differences between the infestation by the two insects compared with control) . The flower diameter changed from 9-11 cm in control to 5-7 and 7-8 cm after infestation by aphid and thrips, respectively, ( significant differences in the flower diameter between the infestation by the two insects compared with control ) . Weight of the flower also decreased from 18-20 g in control to 15-17 and 16-18 g after infestation by aphid and thrips, respectively, (significant differences in weight of the flower between the infestation by the two insects compared with control) . The stem length decreased from 40-50 in control to 25-30 and 30-35 cm after infestation by aphid and thrips, respectively,(significant differences in the stem length between the infestation by the two insects compared with control) . The size and colour of the leaves also changed, which were large and light green in control to large and green after infestation by aphid and thrips. The vase life decreased from 8-10 days in control to 5-6 and 6-8 days after infestation by aphid and thrips, respectively, (significant differences in the vase life between the infestation by the two insects compared with control) . Finally, the annual production reached to 120-140 flower/m<sup>2</sup>/year in control, but decreased to 80-90 and 100-110 flower/m<sup>2</sup>/year after infestation by aphid and thrips, respectively,(significant differences between the infestation by the two insects compared with control) .

For (*Rosa gallica* variety), the colour not changed after infestation by the two insects . Petals containing 25-30 petals / flower in control, whereas containing 15-20 and 20-25 petals / flower after infestation by aphid and thrips, respectively,(significant differences between the infestation by the two insects compared with control).The flower diameter changed from 10-12 cm in control to 6-8 and 8-10 cm after infestation by aphid and thrips, respectively , (significant differences in the flower diameter between the infestation by the two insects compared with control). Weight of the flower also decreased from 15-17 g in control to 11-13 and 13-15 g after infestation by aphid and thrips, respectively,(significant differences in weight of the flower between the infestation by the two insects compared with control). The stem length decreased from 60-70 cm in control to 40-50 and 50-60 cm after infestation by aphid and thrips, respectively,(significant differences in the stem length between the infestation by the two insects compared with control). The size and colour of the leaves also changed, which were very large and light green in control to large and green after infestation by aphid and thrips. The vase life decreased from 7-9 days in control to 4-6 and 5-7 days after infestation by aphid and thrips, respectively,(significant differences in the vase life between the infestation by the two insects compared with control).

Finally, the annual production reached to 90-110 flower/m<sup>2</sup>/year in control, but decreased to 50-60 and 70-80 flower/m<sup>2</sup>/year after infestation by aphid and thrips, respectively,(highly significant differences between the infestation by the two insects compared with control) . For (*Lambada* variety), the colour not changed after infestation by the two insects . Petals containing 30-40 petals/flower in control, whereas containing

15-20 and 20-25 petals/flower after infestation by aphid and thrips, respectively, (significant differences between the infestation by the two insects compared with control). The flower diameter changed from 8-10 cm in control to 4-6 and 5-7 cm after infestation by aphid and thrips, respectively, (significant differences in the flower diameter between the infestation by the two insects compared with control). Weight of the flower also decreased from 17-19 g in control to 13-15 and 15-17 g after infestation by aphid and thrips, respectively, (significant differences in weight of the flower between the infestation by the two insects compared with control). The stem length decreased from 50-60 cm in control to 30-40 and 40-50 cm after infestation by aphid and thrips, respectively, (significant differences in the stem length between the infestation by the two insects compared with control). The size and colour of the leaves not changed after infestation by aphid and thrips. The vase life decreased from 5-7 days in control to 3-4 and 4-5 days after infestation by aphid and thrips, respectively, (significant differences in the vase life between the infestation by the two insects compared with control).

Finally, the annual production reached to 110-130 flower/m<sup>2</sup>/year in control, but decreased to 70-90 and 90-110 flower/m<sup>2</sup>/year after infestation by aphid and thrips, respectively, (significant differences between the infestation by the two insects compared with control).

The obtained results are in agreement with those obtained by Jaskiewicz (2006) in Poland who studied the effect of the feeding of aphids *M. rosae* on the flowering of roses and reported that aphid *M. rosae* when found in greater numbers caused deformation of the leaf blades, the shorting of shoots and petioles, as well as deformation of the flowers. Also Suttern (2005) in Netherlands who studied the effect of *F. occidentalis* on rose plants, and stated that flower damage caused by *F. occidentalis* depends on the season and number of thrips on the flower and conducted a study to determine the relationship among silver damage on the leaves and flower damage. and Sauer (1997) in Germany reported that petal damage could not always be attributed to thrips infestation (number of thrips) only but also attributed to the time of the infestation, total infestation percentages depending on the average colonization /week.

#### **Imported varieties:**

Data in Table (2) show that the effect of infestation on the morphological characters of imported rose varieties, for (Carmen variety), the colour changed from dark red in control to red as a result of infestation by the two insects. Petals containing 30-35 petals / flower in control, whereas containing 20-23 and 25-30 petals / flower after infestation by aphid and thrips, respectively, statistical analysis in Table (2) show significant differences between the infestation by the two insects compared with control. The flower diameter changed from 10-11 cm in control to 8-9 and 9-10 cm after infestation by aphid and thrips, respectively, (significant differences in the flower diameter between the infestation by the two insects compared with control). Weight of the flower also decreased from 18-20 g in control to 14-16 and 16-18 g after infestation by aphid and thrips, respectively, (significant differences in weight of the flower between the infestation by the two insects compared with control).

Table 2: Effect of infestation by aphid and thrips on the morphological characteristics of imported rose varieties.

Adjective	Carmen			SA	Golden gate			SA	Dream			SA	Virginia			SA
	Control	Aphid	Thrips		Control	Aphid	Thrips		Control	Aphid	Thrips		Control	Aphid	Thrips	
Colour	Dark red	red	red	-	yellow	yellow	yellow	-	pink	pink	pink	-	White	white	white	-
No. of Petals/flower	30-35	20-23	25-30	F = 18.15** LSD = 4.47	25-30	15-20	20-25	F = 6.33* LSD = 7.77	30-40	15-20	20-30	F = 12.54** LSD = 8.66	25-35	18-20	20-25	F = 8.86* LSD = 6.65
Flower diameter/cm	10-11	8-9	9-10	F = 9.02* LSD = 1.15	9-10	7-8	8-9	F = 9.33* LSD = 1.15	10-12	6-8	8-10	F = 12.06** LSD = 1.97	10-11	6-8	8-10	F = 13.01** LSD = 1.76
Weight/g	18-20	14-16	16-18	F = 12.00** LSD = 1.99	17-19	13-15	15-17	F = 12.08** LSD = 1.97	17-19	13-15	15-17	F = 12.88** LSD = 1.99	16-18	13-15	14-16	F = 7.03** LSD = 1.99
Stem length/cm	40-50	25-35	30-40	F = 7.03* LSD = 9.99	40-50	20-25	30-40	F = 20.62** LSD = 8.66	40-50	20-25	30-40	F = 20.61** LSD = 8.65	50-60	30-40	40-50	F = 12.08** LSD = 9.98
Leaves	Very large and light green	Large and green	Large and green	-	Large and light green	Large and green	Large and green	-	Large and light green	Large and green	Large and green	-	Very bright green	green	green	-
Vase life/day	10-12	6-8	8-10	F = 12.01* LSD = 1.98	8-10	5-6	7-8	F = 18.20** LSD = 1.49	8-10	5-6	7-8	F = 18.20** LSD = 1.49	10-12	6-8	8-10	F = 12.07** LSD = 1.98
Annual production flower/m <sup>2</sup> year	160-180	130-140	140-160	F = 12.33** LSD = 17.30	200-220	160-170	180-200	F = 20.33** LSD = 17.30	200-220	160-170	180-200	F = 20.33** LSD = 17.30	120-130	80-100	100-120	F = 12.33** LSD = 17.03

SA = Statistical analysis

\* - significant

\*\*\* - high significant

ns - non significant

\*\* - significant

The stem length decreased from 40-50 cm in control to 25-35 and 30-40 cm after infestation by aphid and thrips, respectively, (significant differences in the stem length between the infestation by the two insects compared with control). The size and colour of the leaves also changed, which were very large and light green in control to large and green after infestation by aphid and thrips. The vase life decreased from 10-12 days in control to 6-8 and 8-10 days after infestation by aphid and thrips, respectively, ( significant differences in the vase life between the infestation by the two insects compared with control ). Finally, the annual production reached to 160-180 flower/m<sup>2</sup>/year in control, but decreased to 130-140 and 140-160 flower/m<sup>2</sup>/year after infestation by aphid and thrips, respectively,(significant differences between the infestation by the two insects compared with control ).

For (Golden gate variety), the colour not changed after infestation by the two insects. Petals containing 25-30 petals / flower in control, whereas containing 15-20 and 20-25 petals/flower after infestation by aphid and thrips, respectively, statistical analysis in Table (2) show significant differences between the infestation by the two insects compared with control. The flower diameter changed from 9-10 cm in control to 7-8 and 8-9 cm after infestation by aphid and thrips, respectively, (significant differences in the flower diameter between the infestation by the two insects compared with control). Weight of the flower also decreased from 17-19 g in control to 13-15 and 15-17 g after infestation by aphid and thrips, respectively, (significant differences in weight of the flower between the infestation by the two insects compared with control ). The stem length decreased from 40-50 cm in control to 20-25 and 30-40 cm after infestation by aphid and thrips, respectively, (significant differences in the stem length between the infestation by the two insects compared with control ). The size and colour of the leaves not changed after infestation by the two insects. The vase life decreased from 8-10 days in control to 5-6 and 7-8 days after infestation by aphid and thrips, respectively, (significant differences in the vase life between the infestation by the two insects compared with control). Finally, the annual production reached to 200-220 flower/m<sup>2</sup>/year in control, but decreased to 160-170 and 180-200 flower/m<sup>2</sup>/year after infestation by aphid and thrips, respectively,(significant differences between the infestation by the two insects compared with control).

For (Dream variety), the colour not changed after infestation by the two insects. Petals containing 30-40 petals / flower in control, whereas containing 15-20 and 20-30 petals / flower after infestation by aphid and thrips, respectively, statistical analysis in Table (2) show significant differences between the infestation by the two insects compared with control.

The flower diameter changed from 10-12 cm in control to 6-8 and 8-10 cm after infestation by aphid and thrips, respectively,(significant differences in the flower diameter between the infestation by the two insects compared with control). Weight of the flower also decreased from 17-19 g in control to 13-15 and 15-17 g after infestation by aphid and thrips, respectively, (significant differences in weight of the flower between the infestation by the two insects compared with control). The stem length decreased from 40-50 in control to 20-25 and 30-40 cm after infestation by

aphid and thrips, respectively, (significant differences in the stem length between the infestation by the two insects compared with control) . The size and colour of the leaves changed, from large, strong and light green in control to large and green after infestation by aphid and thrips . The vase life decreased from 8-10 days in control to 5-6 and 7-8 days after infestation by aphid and thrips, respectively,(significant differences in the vase life between the infestation by the two insects compared with control) . Finally, the annual production reached to 200 - 220 flower/m<sup>2</sup>/year in control, but decreased to 160-170 and 180-200 flower/m<sup>2</sup>/year after infestation by aphid and thrips, respectively, (significant differences between the infestation by the two insects compared with control).

For (Virginia variety) , the colour not changed after infestation by the two insects. Petals containing 25-35 petals/ flower in control, whereas containing 18-20 and 20-25 petals/flower after infestation by aphid and thrips, respectively, statistical analysis in Table (2) show significant differences between the infestation by the two insects compared with control . The flower diameter changed from 10-11 cm in control to 6-8 and 8-10 cm after infestation by aphid and thrips, respectively,(significant differences in the flower diameter between the infestation by the two insects compared with control) .Weight of the flower also decreased from 16-18 g in control to 13-15 and 14-16 g after infestation by aphid and thrips,( significant differences in weight of the flower between the infestation by the two insects compared with control) .The stem length decreased from 50-60 cm in control to 30-40 and 40-50 cm after infestation by aphid and thrips, respectively, (significant differences in the stem length between the infestation by the two insects compared with control) . The size and colour of the leaves changed, from very bright green in control to green after infestation by aphid and thrips. The vase life decreased from 10-12 days in control to 6-8 and 8-10 days after infestation by aphid and thrips, respectively, significant differences in the vase life between the infestation by the two insects compared with control) .

Finally, the annual production reached to 120-130 flower/m<sup>2</sup>/year in control, but decreased to 80-100 and 100-120 flower/m<sup>2</sup>/year after infestation by aphid and thrips, respectively,(significant differences between the infestation by the two insects compared with control). Finally , the trend was achieved in imported varieties was similar to that obtained in the case local varieties. This trend is in agreement with results obtained by Jaskiewicz (2006) , Sauer (1997) and Suttern ( 2005 ) .

Data in Fig. (1) show the effect of infestation (artificially) with aphid and thrip on vascular bundle (bundle sheath, xylem vessels and phloem), which make an important role in transporting water and nutrient from soil to plants and from leaves to all parts of rose plant. The obtained results are in agreement with those obtained by Peng and Miles, (1991 ) in Australia reported that *M. rosae* feeding on rose occurs in the parenchymal and vascular tissues , and the infestation concentration on these parts , Shama and Johri, ( 2004 ) in India studied the effect of some insects on rose plants.



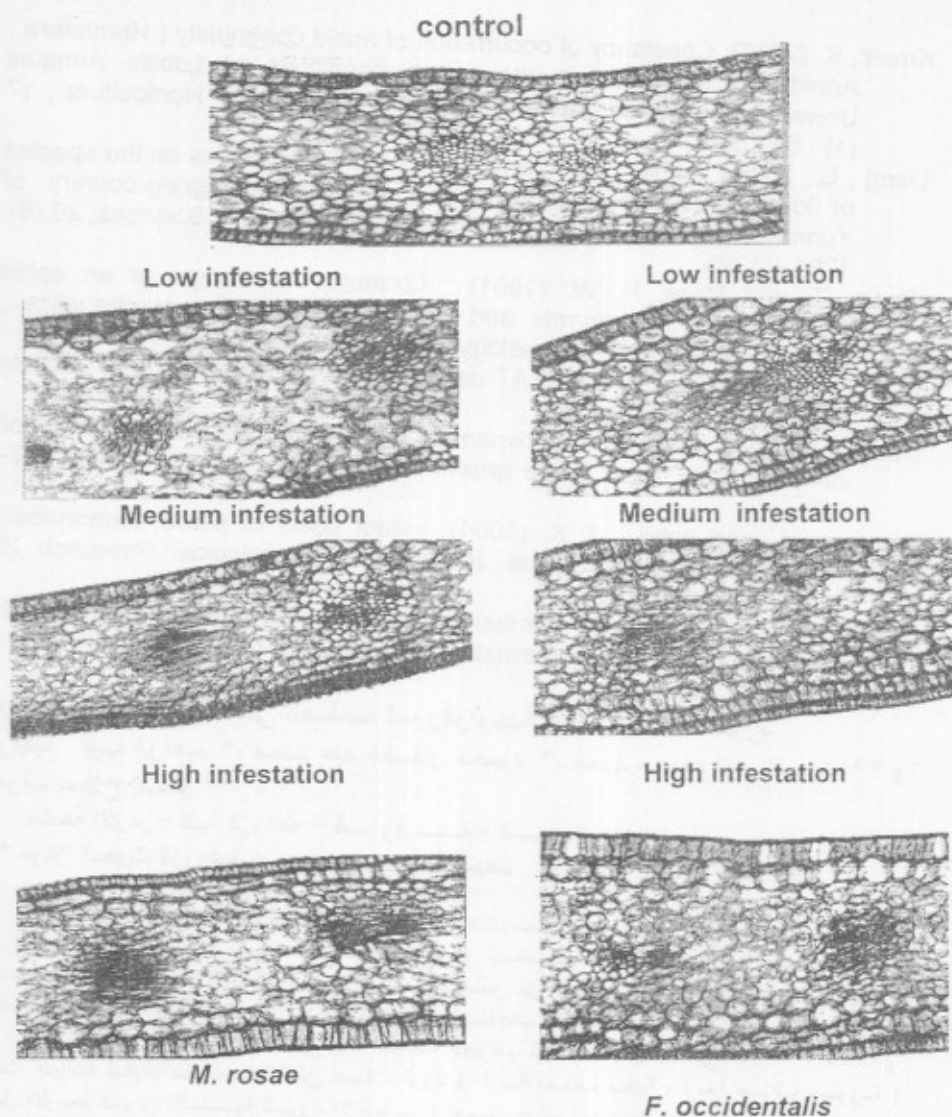


Fig. (1): The damage symptoms of rose tissues after infestation by *Macrosiphum rosae* (L.) and *Frankliniella occidentalis* (Pergande) on rose plants

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### أثر الإصابة الحشرية على الصفات المورفولوجية لبعض أصناف الورد

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يعتبر الورد من أهم نباتات تزيينة في مصر و كذلك مختلف دول العالم . حيث يتم إنتاج نباتات الورد أساسا للتزيين الداخلي والخارجي ، و أيضا لاستخلاص العطور و البارافانات و مستحضرات التجميل المختلفة ، كما يستخدم الزيت المستخلص من الورد في العديد من الأغراض الطبية المختلفة ، كما تستخدم بتلات الورد كذلك في العديد من الصناعات الغذائية المختلفة.

تمت الدراسة في حديقة الأورمان - محافظة الجيزة و ذلك خلال عامي ٢٠٠٤ - ٢٠٠٥ و شملت الدراسة ثمانية أصناف مختلفة من أصناف الورد ( أربعة أصناف محلية ، أربعة أصناف مستوردة ) تشمل الأربعة ألوان الأساسية للورد ألا وهي : أحمر - أصفر - بنك ( وردى ) - أبيض . وشملت الأصناف المحلية كلا من : سندريلا ( أحمر ) - بيانكا ( أصفر ) - روزا جاليكا ( بنك ) - لامبادا ( أبيض ) ، و شملت الأصناف المستوردة كلا من : كارمن ( أحمر ) - جولدن جيت ( أصفر ) - دريم ( بنك ) - فيرجينيا ( أبيض ) . هدفت الدراسة إلى قياس أو تقدير تأثير حشرتي *Macrosiphum rosae* L. ، *Frankliniella occidentalis* ( Pergande) على أصناف الورد المختلفة محلل الدراسة . أوضحت النتائج أن جميع الصفات المورفولوجية لجميع الأصناف المحلية والمستوردة ( لون الزهرة - عدد البتلات في الزهرة - قطر الزهرة - وزن الأزهار - طول الساق - لون الأوراق - ومعدل الإنتاج الموسمي) تأثرت تأثيرا واضحا نتيجة الإصابة بحشرتي من الورد و التريس. أيضا أوضحت الدراسة أن الإصابة الحشرية تتركز في الحزم الوعائية والخلايا البارنشيمية لبتلات الورد، وكان تأثير حشرة المن أعلى نسبيًا من تأثير حشرة التريس .