EFFECT OF SIX STRAWBERRY CULTIVARS ON THE POPULATION DENSITY OF THREE SUCKING PESTS AND ON CERTAIN BIOLOGICAL ASPECTS OF *SPODOPTERA LITTORALIS* BOISD.

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INTRODUCTION

Among the different vegetable crops in Egypt, strawberry *Fragaria* x *ananassa* Douch is considered one of the most important crops for both local consumption and export. Newly introduced strawberry cultivars must be carefully evaluated for the foliage and fruit damaging pests establishing indices for the plant resistance in relation to yield.

Plants of strawberry suffer from sap sucking pests; such as aphids, whiteflies and mites. The damage of mites to strawberries is expressed as stippling, scarring and bronzing of the leaves and calyx, resulting in reduced vegetative vigor and in extreme cases, plant mortality, detected by Scanes *et al.* (1981). Neal *et al.* (1998) recorded that *T. urticae* is a cell feeder with stylet penetration no more than 100 μ, while adult and immature whiteflies reach the phloem vessel feeding in the sieve elements. Aphids transmit virus diseases. Many researchers reported the resistance of some cultivars against these pests (Doss *et al.*, 1997 and Easterbrook and Simpson, 1998).

The present study aims to evaluate the population density of three sucking pests (*Bemisia tabaci* Genn., *Myzus persicae* Sulzer and *Tetranychus urticae* Koch) on six strawberry cultivars. Also, the effect of strawberry cultivars on certain biological aspects of *Spodoptera littoralis* (Boisd.) was studied.

MATERIAL AND METHODS

The experiment was conducted at Barrage Research Station, Qualubia Governorate during two successive seasons (December - May) of 2002-2003 and 2003-2004, for evaluating the infestation of six strawberry cultivars [Selvae (cv.1),

Osogrande (cv.2), Camerosa (cv.3), Charlesbad (cv.4), Sweet Charlie (cv.5) and Cabarla (cv.6)] with *B. tabaci, M. persicae* and *T. urticae* infestation. Each cultivars was of 4 replicates, each replicate of 4 rows (area 12 m^2). Weekly samples of five randomly leaves were picked from each cultivar and each replicate in a separate bag. The sample was taken six weeks after the planting date (mid-October). The inspection was carried out in laboratory, examined with the aid of stereomicroscope to evaluate the population density of *B. tabaci* (nymphs and pupae), *M. persicae* (nymphs and adults) and (mobile stages) of *T. urticae.*

To study the effect of the six strawberry cultivars on the total larval and pupal duration periods, pupal weight, pupal mortality and moth deformation, laboratory egg-masses were used. The newly hatched larvae (5 larvae/dish) were provided daily with fresh leaves of each cultivar separately, replicated five times. All dishes were incubated in constant temperature of 25±5°C and 65±5 % R.H.

The statistical analysis of variance was according to Snedecor and Cochran (1967), the means were separated at 5 % level for field study and 1 % for laboratory study.

RESULTS AND DISCUSSION

Data in Tables (1, 2 & 3) showed the population density of the three sucking pests.

B. tabaci population was ranged from 0.00 to 5.00 ind./leaf, the highest population was recorded during January for all the cultivars followed by December. The light population was recorded in March and May. Osogrande was the most infested cultivars (9.50 and 7.65 ind./leaf) for 1*st* and 2*nd* season, respectively, followed by Camerosa, Cabarla cultivar was the least infested (0.30 ind./leaf) for both seasons (Table I). Doss *et al.* (1997), found that the high infestation was on Chandler and Douglas cultivars and moderate on Selvae during November and December. Bachatly *et al.* (2002) found that Osogrande was of high population during summer season (May-Dec.). These results agree partially with El-Shimi *et al.* (2002), they found that Osogrande was the more infested cultivar than Camerosa in the control treatment and the high infestation was during December for Camerosa and January for Osogrande. Statistical analysis showed significant differences were found among the tested cultivars.

Myzus persicae population was ranging from 0.00 to 0.79 ind./leaf (Table II). January was the characteristic month of high population for both seasons,

followed by February and the least record was during May. The high infested cultivar by aphids were Camerosa, Cabarla and Sweet Charlie for the first season. While for the second season was Sweet Charlie, Camerosa and Cabarla. The least infested cultivars were Charlesbad and Osogrande for both seasons. These results were in agreement with El- Shimi *et al.* (2002), where the high population of *Myzus* was detected on Camerosa cv. during February and in January for Osogrande. Camerosa cv. was more infested than Osogrande cv. by *Myzus*. Significant differences were observed among cultivars.

Mite population, ranging from (0.05 to 130.76 and 0.00 to 142.8 ind./leaf) for first and second seasons, respectively (Table III). *Tetranychus* population increased steadily during March and picked in April for the both seasons, recording (130.75, 117.05 and 109.85 ind./leaf) on Selvae, Sweet Charlie and Osogrande, respectively, during the 1*st* season. While, for the 2*nd* season, the populations were (142.80, 108.05 and 103.55 ind./leaf) for Osogrande, Selvae and Sweet Charlie, respectively. *Tetranychus* was more detected on Selvae cv. followed by Osogrande cv. and the least infested cultivar was Charlesbad. The characteristic month of low record was December. The previous studies agree with that the Selvae cultivar was the most infested cultivar by *T. urticae*. McFarlane and Hepworth (1994), Doss *et al.* (1997), Walsh *et al.* (1998) and Bachatly (2002), who recorded the high infestation on Selvae and Chandler cultivars. While, Ebrahim *et al.*. (2002) that Chandler varieties was the most infested by *T. urticae* and Camerosa was of least number record followed by Rosalinda and Sweet Charlie. Statistical analysis showed highly significant between cultivars.

The cultivar which was highly infested by *T. urticae* was less to *M. persicae* and *B. tabaci* as Selvae cv. Charlesbad cv. as the least infested cultivar by the three pests followed by Cabarla cv. for *T. urticae* and *B. tabaci*. The high population was detected through the first season than the second season for the three sucking pests on the six cultivars.

Data obtained in Table (4), showed that Selvae cultivar was of high larval and pupal period, high pupal mortality, moderate pupal weight, least moths deformation. Charlesbad cultivar was characteristic by moderate larval and pupal period, low pupal weight, high pupal mortality and moths deformation. Osogrande cultivar was of high pupal weight, moderate larval and pupal periods and the lowest of pupal mortality. This agree with Abd El-Malak (2002) where Osogrande compared with Camerosa was of high larval and pupal period and high pupal weight, while the high deformation was recorded for Camerosa (in the control treatment).

TABLE (I)

Average numbers of *B. tabaci* (ind./leaf) (nymphs + pupae) infesting six strawberry cultivars during two seasons (2002-2003) and (2003-2004).

Seasons	1*st* season						2*nd* season					
Cultivars / Months	Selvae (cv.1)	Oso-Grande (cv.2)	Came-rosa (cv.3)	Chales-bad (cv.4)	Sweet Charlie (cv.5)	Cabarla (cv.6)	Selvae (cv.1)	Oso-Grande (cv.2)	Came-rosa (cv.3)	Chales-bad (cv.4)	Sweet Charlie (cv.5)	Cabarla (cv.6)
December	0.65	2.90	2.00	0.40	0.85	0.15	0.80	2.15	1.65	0.25	0.45	0.10
January	1.25	5.00	3.85	0.10	0.90	0.15	0.85	4.20	2.90	0.15	0.35	0.20
February	0.40	0.70	0.80	0.10	0.45	0.00	0.35	0.65	0.80	0.05	0.10	0.00
March	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00
April	0.20	0.45	0.45	0.00	0.00	0.00	0.00	0.35	0.20	0.00	0.00	0.00
May	0.00	0.30	0.15	0.00	0.15	0.00	0.10	0.10	0.10	0.00	0.00	0.00
Total	2.50	9.50	7.25	0.60	2.35	0.30	2.10	7.65	5.65	0.45	0.90	0.30

L.S.D.0.05 of :		
Cultivars	0.006	0.018
Months	0.349	2.918
Cv. x months	0.341	1.302

TABLE (II)

Average numbers of *M. persicae* (ind./leaf) (adults + nymphs) infesting six strawberry cultivars during two seasons (2002-2003) and (2003-2004).

Seasons	1*st* season						2*nd* season					
Cultivars / Months	Selvae (cv.1)	Oso-Grande (cv.2)	Camerosa (cv.3)	Chalesbad (cv.4)	Sweet Charlie (cv.5)	Cabarla (cv.6)	Selvae (cv.1)	Oso-Grande (cv.2)	Camerosa (cv.3)	Chalesbad (cv.4)	Sweet Charlie (cv.5)	Cabarla (cv.6)
December	1.85	0.50	2.50	0.35	3.10	0.35	0.85	0.35	1.45	0.40	2.05	0.25
January	2.60	0.80	2.70	1.75	3.05	3.15	1.05	0.55	1.75	1.45	2.10	2.10
February	0.20	0.30	2.95	1.10	1.50	2.70	0.30	0.40	1.30	1.15	1.45	1.75
March	0.20	0.35	1.00	0.00	0.80	1.70	0.25	0.25	0.75	0.20	1.05	1.10
April	0.00	0.45	1.15	0.00	0.25	1.00	0.20	0.45	1.10	0.00	0.20	0.60
May	0.20	0.95	0.45	0.00	0.25	0.20	0.15	0.40	0.40	0.00	0.20	0.20
Total	4.45	3.35	10.75	3.20	8.95	9.10	2.80	2.40	6.75	3.20	7.05	6.00

L.S.D.0.05 of:		
Cultivars	0.012	0.009
Months	1.274	0.594
Cv. x months	1.245	0.581

TABLE (III)

Average numbers of *T. urticae* (ind./leaf) (moving stages) infesting six strawberry cultivars during two seasons (2002-2003) and (2003-2004).

Seasons	1*st* season						2*nd* season					
Cultivars / Months	Selvae (cv.1)	Oso-Grande (cv.2)	Came-rosa (cv.3)	Chales-bad (cv.4)	Sweet Charlie (cv.5)	Cabarla (cv.6)	Selvae (cv.1)	Oso-Grande (cv.2)	Came-rosa (cv.3)	Chales-bad (cv.4)	Sweet Charlie (cv.5)	Cabarla (cv.6)
December	0.35	1.75	0.60	0.00	1.30	0.05	0.25	0.30	0.00	0.00	0.20	0.00
January	1.75	1.80	1.60	0.25	1.95	1.10	0.80	0.65	0.85	0.20	1.15	0.85
February	29.45	25.50	21.15	5.80	18.00	20.45	26.10	21.65	16.75	5.55	16.40	18.80
March	110.4	77.95	79.60	15.90	106.90	58.00	96.75	74.25	55.90	14.40	101.85	51.50
April	130.75	109.25	105.15	8.70	117.05	45.95	108.05	142.80	101.75	7.80	103.55	38.40
May	5.30	4.25	3.40	0.80	5.05	2.80	4.20	11.55	10.50	0.60	2.35	1.60
Total	278.00	220.50	211.05	31.45	250.25	128.35	237.65	251.20	185.75	28.55	225.50	111.15

L.S.D.0.05 of :		
Cultivars	0.030	0.420
Months	0.497	2.918
Cv. x months	0.473	0.143

TABLE (IV)

Susceptibility of six strawberry cultivars to the larval and pupal period (days, mean ± S.D.), pupal weight (g, mean ± S.D.) and percentage of pupal mortality and moth deformation (%) of *S. littoralis* under the laboratory conditions (25±0.5°C and 65±5 % R.H.).

Cultivars	larval period 1*st* inst.-pupa (days)	Pupal period (days)	Pupal weight (g.)	% Pupal mortality	% Moth deformation
Selvae	40.6±2.302	10.0±1.00	0.116±0.11	55.55	11.11
Osogrande	32.8±0.836	8.8±1.48	0.138±0.013	2.272	27.90
Camerosa	28.4±0.894	9.0±1.58	0.122±0.013	14.63	16.66
Charlesbad	30.0±1.225	4.8±1.48	0.106±0.005	30.00	42.85
Sweet Charlie	33.0±3.535	4.6±1.40	0.112±0.013	25.00	16.66
Cabarla	28.6±2.793	5.4±1.40	0.124±0.005	10.00	44.44
L.S.D. value	1.958	1.279	0.703		

Charlesbad cultivar may be more cultivated to its resistance to whiteflies, aphids and spider mite causing death of cotton leafworm pupa, while Selvae cultivar may be used as trap crop for catching Acari and *Spodoptera*. Statistical analysis showed highly significant between cultivars. The shape of plant structures such as trichomes has been shown to be the basis of insect resistance in some crop plants (Norris and Kogan, 1980). After that may the results revealed to to the morphological or histological differences between cultivars.

SUMMARY

The infestation of six strawberry cultivars with *B. tabaci, M. persicae, T. urticae* and *S. littoralis* was studied during two successive seasons at Barrage Horticulture Station at Qualubia Governorate. Results showed that Osogrande cv. was the most infested by *Bemisia* followed by Camerosa. Camerosa cultivar harboured high population of *Myzus* followed by Cabarla and Sweet Charlie cultivars during the first season, while during the second season was Sweet Charlie followed by Camerosa. Selvae cultivar was highly attacked by *Tetranychus* followed by Osogrande cultivar. The resistant cultivar to the three sucking pests was Charlesbad. Selvae cultivar gave high pupal mortality and Charlesbad gave high moth deformation for *Spodoptera littoralis*.

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