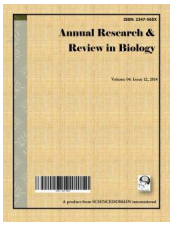

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Susceptibility of Eggplant Cultivars to Sap-Sucking Insect Pest's Infestation

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Authors' contributions

This work was carried out in collaboration between both authors. Author RSR designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Author EAMG managed the analyses of the study and managed the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

The present study was carried out to study the changes in the population density of three main pests attacking two varieties of eggplant (*Solanum melongena*). The three insect pests were *Bemisia tabaci* (Genn), *Aphis gossypii* (Glover) and *Empoasca decipien*s (Paoli). The seasonal changes in the population density for three main pests formed two peaks during 2012/2013 season on two varieties. The first peak for *B. tabaci* was recorded on (classic variety) during the first weak December, the second peak was recorded at the first week of March. For (Sicilian variety) the first peak occurred on the second week of December while second peak was recorded on the end of February. The first peak for *A. gossypii* on (Classic v.) occurred through mid of December and the second formed on mid of arch. The second peak was recorded through mid of March. For (Sicilian v.) the first and second peak were stated at the end December and at the end of February respectively. The population density of *E. decipiens* of the first peaks

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was recorded on (Classic v.) mid of December and the second peak was recorded on mid of February. For (Sicilian v.) the two peaks occurred on mid of February and mid of March respectively.

Keywords: Eggplant; cultivars; infestation; whitefly; aphids.

1. INTRODUCTION

Eggplant is the most important vegetable crop in Egypt. Eggplants are rich in dietary fiber, vitamins and minerals. The essential minerals present in eggplants include potassium and magnesium. Eggplant is infested by different insect pests which caused several damages for plants; Sap-Sucking insects pest are considered the most dangerous insect pest: *B. tabaci*, *A. gossypii* and *E. decipiens*. These pests when attacking plant, they suck the plant juice and secrete honeydew which causing the spiracles of plant leaves. They also attract ants and allow to grow fungi and bacteria which increase the damages. Seasonal abundance of three insect pests was high during the summer [1-3]. Population density was fluctuated according to temperature as main factor, so, activity and population density are decreased when temperature is recorded low degrees as winter season [4-6]. Population density of these pests has been studied by [6]. These insects sucking the plant sap and also inject toxic saliva into the plant tissues, which leads to yellowing as well as secreting large quantities of honeydew, which favors the growth of sooty mold on leaf surfaces and reduces the photosynthetic efficiency of the plants as well as some of these insects species have the ability to plant viruses transmitting [7-9].

The aim of this study is to monitor the fluctuation densities of three main pests (*B. tabaci*, *A. gossypii* and *E. decipiens*) attacking eggplant on two eggplant varieties (Classic and Sicilian).

2. MATERIALS AND METHODS

2.1 Experimental Locality

The present study was carried out at the experiment greenhouse attached to the faculty of Agriculture, Ain Shams University, Qalyubia governorate. Field trial was conducted during 2012-2013 season on eggplant. An area of about 200 m^2 was divided into 2 equal plots, each plot divided into 2 replicates, included 5 rows each [10]. These two plots were sown with two varieties of eggplant (Classic and Sicilian) seeds on 14th October, 2012.

2.2 Monitoring the Changes in the Fluctuation in the Population Density of *Bemisia tabaci*, *Aphis gossypii* and *Empoasca decipiens*

For monitoring the fluctuations in the population density of three insect pests, weekly samples of 10 leaves/replicate were taken randomly. Leaves were carefully examined in the field early in the morning; three insect pests were counted and recorded [11].

2.3 Statistical Analysis

The obtained data were analyzed by using SAS institute statistical software [12]. Significant differences between two varieties were determined by (t. test).

3. RESULTS AND DISCUSSION

3.1 Classic Variety

3.1.1 *Bemisia tabaci*

Data tabulated in Table 1 and Fig. 1 that the population of *Bemisia tabaci* was relatively high during the first week of December, and then the population decreased during the second week of January to the first week of February with zero number. Population increased gradually from the beginning of the second week of February to form the highest number on the first week of March. It could be concluded that there are two main peaks during the eggplant season, these results agreed with [13].

3.1.2 *Aphis gossypii*

Data tabulated in Table 1 and Fig. 2, shown that the population of *A. gossypii* formed fluctuation during the season. The first peak was recorded at the mid of December, then it oscillate decreased during the period from last December increased gradually till the mid of February. Population increased gradually to through mid of March where the population up and down during this period.

Table 1. The changes in the population density of three main pests attacking two varieties of eggplant at the experimental greenhouse at faculty of agric. through 2012/2013 season

Inspection date	Classic variety			Sicilian variety		
	B. tabaci	***A. gossypii***	***E. decipiens***	***B. tabaci***	***A. gossypii***	***E. decipiens***
03-12-2012	8	9	1	12	7	15
10-12-2012	7	1	2	18	1	6
17-12-2012	0	15	13	0	1	11
24-12-2012	0	6	7	15	5	4
31-12-2012	9	4	5	12	2	1
07-01-2013	11	1	3	9	1	1
14-01-2013	0	3	3	0	2	2
21-01-2013	0	6	4	0	5	4
28-01-2013	0	2	4	0	4	6
04-02-2013	0	5	6	0	9	3
11-02-2013	4	0	2	14	0	4
18-02-2013	0	3	11	8	5	1
25-02-2013	14	8	5	17	12	9
04-03-2013	16	4	8	13	2	7
11-03-2013	0	9	8	7	11	12
18-03-2013	13	0	0	0	7	0
25-03-2013	11	3	1	12	3	1
Total	93	79	83	137	77	87

3.1.3 *Empoasca decipiens*

Data tabulated in Table 1 and Fig. 3, reported that *E. dicipiens* had two peaks during eggplant season. Population increased gradually from the beginning of the season to form the highest number on the mid of December to form the first peak, then fluctuation decreased thought January and February. Population increased again to reach the highest number on the mid of February to form the second peak.

3.2 Sicilian Variety

3.2.1 *Bemisia tabaci*

Data were tabulated in Table 1 and Fig. 1 indicated that *B. tabaci* had two peaks during season, first was recorded on the first week of Jabuary where the population density recorded highest number, then it decreased during the month and beginning of February. Population increased gradually to reach the maximum at the first week of March. When data analysis statistically analyzed, there were significant difference between two varieties where "t value = 16.2", these results agreed with [14-16].

3.2.2 *Aphis gossypii*

Population of *A. gossypii* could be shown in Table 1 and Fig. 2. Population of *A. gossypii* also formed 2 peaks. The first was recorded on the mid of December, and then it decreased through January and February to record the lowest number. Population increased again to form the second peak on the end of February, and then it decreased again. It yielded no significant difference between two varieties, where "t value = 0.3", these results related to [17-18]. [19], reported that the major aphids in Syria as potato pests were considered to be *M. persicae* and *A. gossypii*, and *A. fabae*. [20-21] recorded the same two species on pepper and eggplant. [22-25]), mentioned that *Aphis gossypii* was the only recorded aphid species attacking eggplant.

3.2.3 *Empoasca* decipiens

Data tabulated in Table 1 and Fig. 3. showed the fluctuation Population of *E. dicipiens*. Two peaks were recorded during the season. First was recorded on the mid of December and the second was reported on the mid of February. Statistically, there are no significant difference between values of the two varieties where "t value = 0.6".

Host plant resistance to pests is ubiquitous but there exists a great deal of variation in the levels expressed by plants. The level of resistance will obviously depend on the specific morphological and biochemical defenses utilized by the plant, but ultimately the expression and stability of the

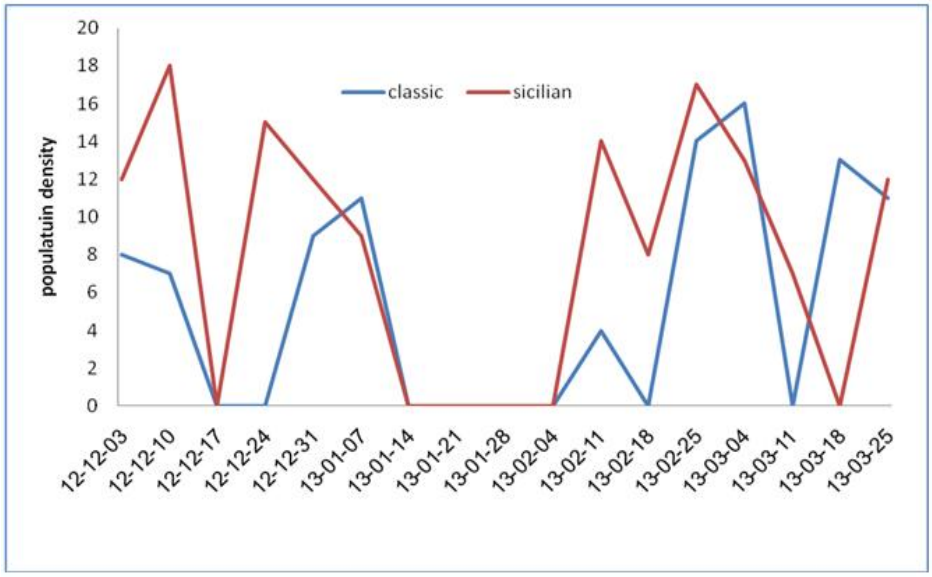

Fig. 1. The seasonal fluctuations in the population density of *B. tabaci* on two eggplant varieties through 2012/2013 season

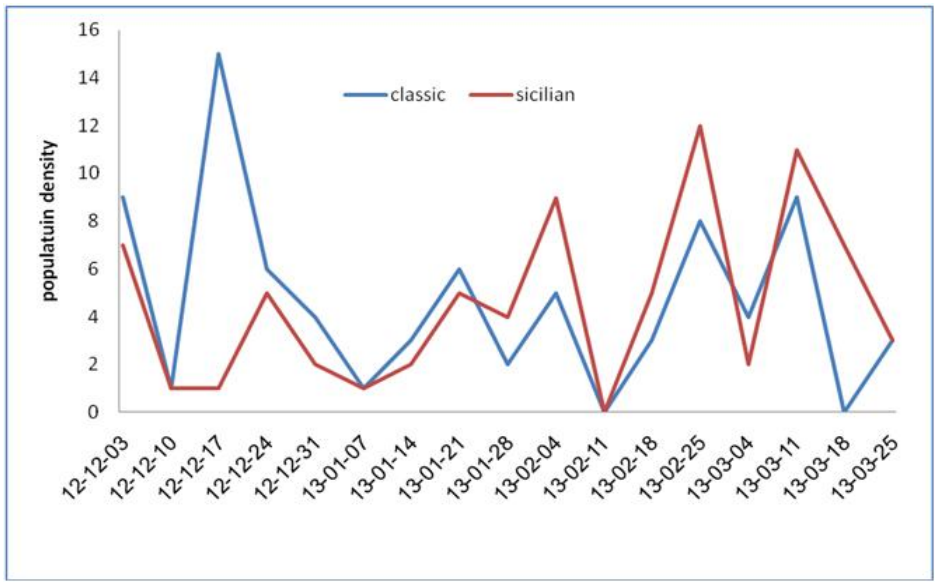

Fig. 2. The seasonal fluctuations in the population density of *A. gossypii* on two eggplant varieties through 2012/2013 season

resistance characters depend on the plant genotype, the pest genotype and the genetic interactions between the plant and the pest [26-28].

Extensive studies have been carried out to identify plant phenolics with insecticidal properties towards insects. The subject of the study was comparison of control and infested by *Acyrthosiphon pisum* (Harris) vegetative parts of pea plants. In the pea plants six flavonol aglycones were identified: quercetin, kaempferol+RCO-, kaempferol, tricin, apigenin+RCO-, and apigenin. In infested plants relatively high concentration of total phenols, o-dihydroxyphenols and total flavonoids in comparison with control were observed. It suggests that phenolics have negative effect on insects and they are good for control of the insect pests [29].

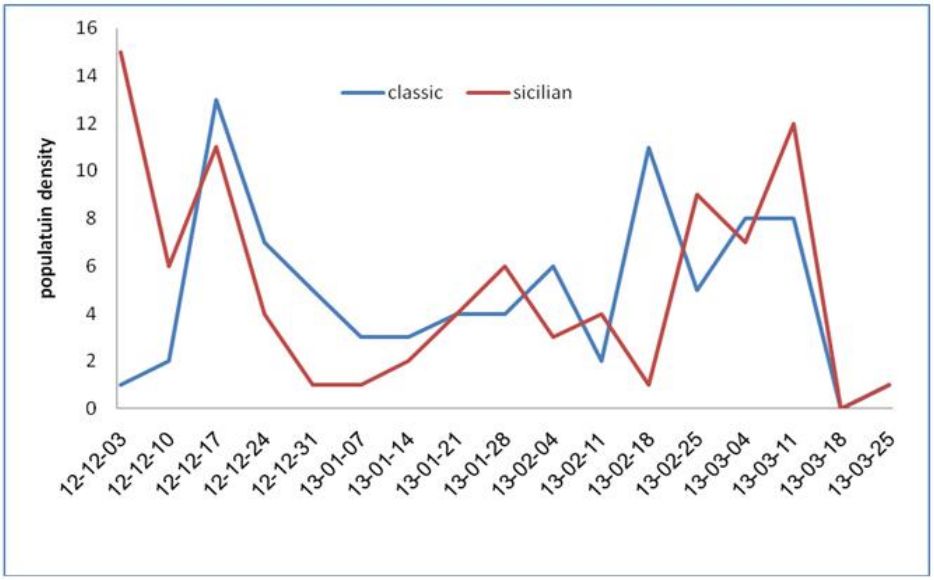

Fig. 3. The seasonal fluctuations in the population density of *E. decipiens* on two eggplant varieties through 2012/2013 season

Significant differences was recorded between different plant species/cultivars and population density of aphids, whiteflies, leafhoppers and Thrips and also with their associated predators. Photosynthetic pigments (Chlorophyll a, Chlorophyll b and Carotenoids) analysis showed negative relationship with sap sucking insect's infestation. Also different leaf biochemical components such as total phenol, total soluble sugars and total free amino acids revealed negative relationship with sap sucking insect's infestation, while total flavonoids analysis showed insignificant differences. [30], cited that total flavonoids group that is considered as a secondary plant metabolite had no biological activity either as anti-feedant or as repellant to different cucumber sap sucking insects [31].

4. CONCLUSION

It can be concluded that there were no differences between the infestation of the two varieties on *Aphis gossypii* and *Empoasca decipiens*, while there was significant differences between the two varieties where Sicilian variety was more sensitive to infestation with *Bemisia tabaci.* These results could be concluded the importance of cultivar selection in any integrated pest management program as well as the effective role of different plant biochemical components on plant resistance against insect pests [31].

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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