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RESEARCH ARTICLE

Response Influence of Sowing Dates Impact *Bemisia tabaci* (Gennadius) Infestation in Cucumber Crops (*Cucumis sativus L.*)

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Abstract: The experiment conducted in a private cucumber field, Ibshway Center, Fayoum governorate, Egypt aimed to assess the influence of sowing dates on the infestation of *Bemisia tabaci* (Gennadius, 1889) in cucumber crops (*Cucumis sativus L.*). The study was carried out over two consecutive years, namely 2018 and 2019. During this period involved three planting dates were considered, namely March, August, and October. Weekly B. tabaci counts were recorded and compared across the different planting dates. According to the results, B. tabaci reached the highest peak of abundance in March sowing date in the second week of May 2018 and in the fourth week of April 2019 and presented by 825 and 1086 individuals/sample, respectively. While, in August sowing date, *B. tabaci* recorded the highest peak of abundance in the second week of October 2018 and in the third week of October 2019 and presented by 1432 and 1656 individuals/sample, respectively. August sowing date recorded the highest percentage of *B. tabaci* dominance during the two years 2018 and 2019 and presented by 50.6 and 48.9%, respectively. March sowing date recorded the lowest percentage of *B. tabaci* dominance during the two years 2018 and 2019 and presented by 23.7 and 25.3%, respectively.
Keywords: IPM, Piercing Sucking Insect Pests, Egypt, climate change

INTRODUCTION

B. tabaci is a very dangerous pest to agricultural crops in the world, as it transmits more than 100 types of plant viruses (Simon et al., 2003). *B. tabaci* (Gennadius) is the famous piercing sucking insect pest known for its devastating impact on crops. This notorious insect poses a significant threat to agricultural productivity, as it causes substantial damage and leads to considerable yield losses. Both nymphs and adults of *B. tabaci* feed directly on the plants, extracting vital sap and nutrients, which weakens the plants, inhibits growth and diminishes overall yield potential. Moreover, the whitefly acts as a vector, transmitting viruses and diseases that further contribute to crop deterioration and reduced quality (Abubakar et al., 2022). Whiteflies are responsible for inflicting substantial damage and causing significant economic losses to crops that are vulnerable to their attacks (Sani et al., 2020). The whitefly, *B. tabaci* (*Genn.*), is recognized as a significant pest that poses a considerable threat to cucumber plants throughout all stages of growth, including seedling, flowering, and fruiting. The peculiar habits of this insect present challenges when it comes to implementing chemical control measures. Whiteflies engage in activities such as feeding, mating and oviposition and larval development on the underside (abaxial surface) of the leaves (Coudriet et al., 1985).

The importance of the study lies in its attempt to establish a connection between planting dates and population *B. tabaci.* By understanding this relationship, farmers can make informed decisions about when to plant their crops, which can have significant implications for pest management and overall crop yield. With this knowledge, farmers can potentially minimize the risk of *B. tabaci* damage and optimize crop growth, leading to improved productivity and economic outcomes for agricultural endeavors. Ultimately, the study's findings could contribute to sustainable farming practices and support food security by ensuring more efficient and effective crop production.

MATERIAL AND METHODS

The experiment was conducted in Ibshway Center, Fayoum Governorate the area was 200 m2 for each sowing date which divided to four equal plots; each plot was 42 m2 which considered as a replicate. Cucumber, *Cucumis sativus* (*L.*) hybrid Heyal was chosen and sown in three different dates as follows: the first week of March (March sowing date), the third week of August (August sowing date), and the first week of October (October sowing date) during the two successive years (2018 and 2019). All the normal agricultural practices were followed in the three sowing dates during the two years except the insecticide treatments that did neglect. The daily average temperature and relative humidity were obtained from the Meteorological station of the agricultural research center Fayoum governorate during the two years. The samples took place after two weeks from the beginning of plantation in the three sowing dates and continued until the end of crop.

A sample of twenty-five leaves was randomly chosen from each plot every week. A total of 100 leaves were picked weekly from the four replicates and transferred in closed plastic bags with a cotton piece saturated by Ether to anesthetize the collected insect pest. The bags were transferred in the same day to the laboratory for investigation by a stereo-binocular microscope.

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STATISTICAL ANALYSIS

The results were recorded. The results were analyzed by one-way ANOVA and means were separated by Duncan's Multiple Range Test (Duncan 1955). Analysis was conducted using CoStata software program.

RESULTS AND DISCUSSION

The results in Fig. (1) Show the population of B. tabaci immature stages on cucumber crop in various sowing dates during the first year 2018 in Fayoum governorate. In March sowing date B. tabaci immature stages peaked the biggest population in the second week of May (25.4 °C and 35.4 RH%) and presented by 825 individuals/sample. Meanwhile, in August sowing date, it had the biggest peak of population in the second week of October (28.5 °C and 44.4 RH%) with 1432 individuals/sample. Moreover, in October sowing date, it raised the biggest peak of abundance in the first week of November (22.1 °C and 41.8 RH%) with 924 individuals/sample.

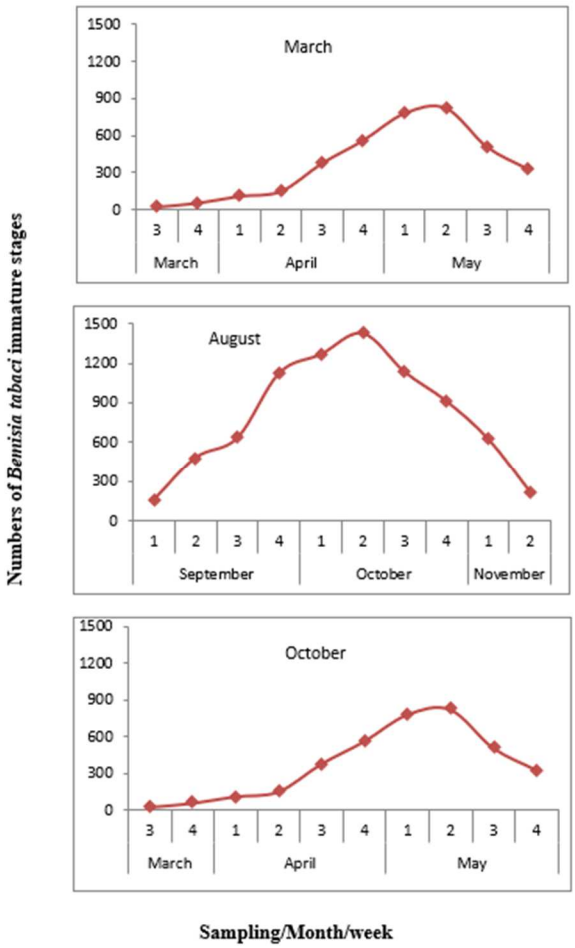

Fig:1

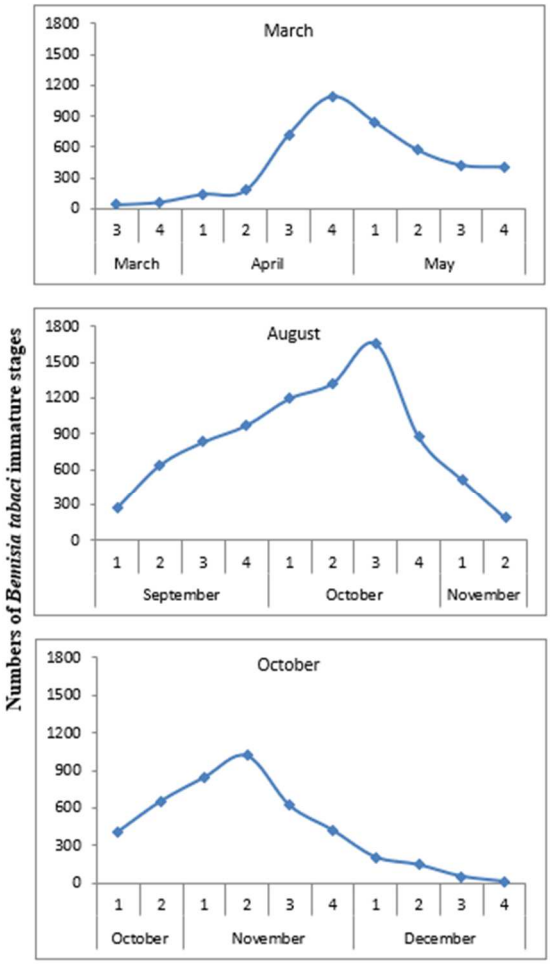

Fig:2

Fig. (1): The population density of *Bemisia tabaci* immature stages at different cucumber sowing dates (March, August, and October) during the first year 2018 in Fayoum governorate.

Fig. (2): The population numbers of *Bemisia tabaci* immature stages at different cucumber sowing dates (March, August, and October) during the second year 2019 in Fayoum governorate.

The results in Fig. (2) Show the population abundance of *B. tabaci* immature stages on cucumber crop in various sowing dates during the second year 2019 in Fayoum governorate. In March sowing date *B. tabaci* immature stages peaked the greatest population in the fourth week of April (19.9 °C and 40.3 RH%) and presented by 1086 individuals/sample. Meanwhile, in August sowing date, it recorded the largest peak of abundance in the third week of October (26.8 °C and 45.6 RH%) with 1656 individuals/sample. Moreover, in October sowing date, it had the greatest peak of abundance in the second week of November (23.1 °C and 48.1 RH%) with 1017 individuals/sample.

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The data in Table (1) show the seasonal average number of B. tabaci immature stages in varying cucumber sowing dates during the two successive years (2018 and 2019) in Fayoum governorate. It can be noticed that, cucumber crop in August sowing date hosted the largest seasonal average number of B. tabaci immature stages during the two years (2018 and 2019) and presented by 800.4 ± 140.20 and 847.9 ± 146.37 individuals/sample. Statistical analysis revealed that highly significant differences were for B. tabaci in relation to the various sowing dates during the two years.

Table (1): The seasonal average number of B. tabaci immature stages in different cucumber sowing dates during the two successive years (2018 and 2019) in Fayoum governorate.

Year	Sowing dates		
	March	August	October
2018	374.2 ± 92.22 c	800.4 ± 140.20 a	406.1 ± 98.59 b
2019	447.2 ± 111.81 b	847.9 ± 146.37 a	438.8 ± 107.96 b

The average numbers followed by the various letters in a raw are significantly different at 0.05 level.

Data in Fig. (3) represent the dominance percentage of B. tabaci immature stages in various cucumber sowing dates during the two years (2018 and 2019). The results revealed that August sowing date recorded the highest percentage of B. tabaci dominance during the two years 2018 and 2019 and presented by 50.6 and 48.9%, respectively. March sowing date recorded the lowest percentage of B. tabaci dominance during the two years 2018 and 2019 and presented by 23.7 and 25.3%, respectively.

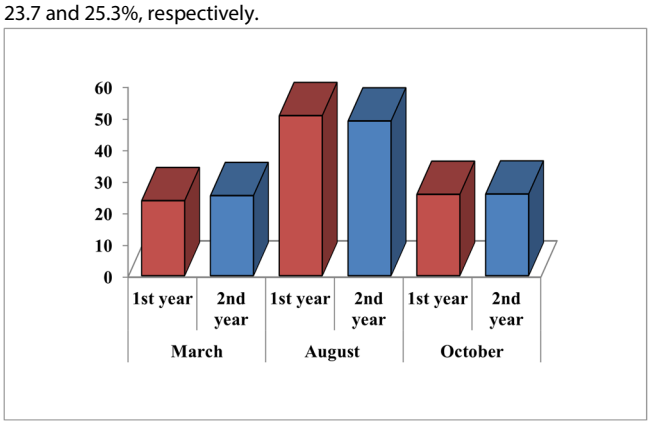

Fig. (3): The seasonal occurrence percentage of B. tabaci in different cucumber sowing dates (March, August, and October) during the first and second years (2018 and 2019) in Fayoum governorate.

The correlation relationships between temperature and the population of B. tabaci immature stages were significant in October plantation of cucumber during the first and second year. However, the relation between immature stages of B. tabaci and relative humidity was only significant in October plantation in the first year, but not in the second year (Table 2).

Table (2): Simple correlation coefficient (r) between the weekly number of B. tabaci immature stages in different cucumber sowing dates and the average of temperature and relative humidity during the two successive years (2018 and 2019) in Fayoum governorate.

Sowing dates	2018		2019	
	Temp.	RH%	Temp.	RH%
March	0.48	-0.12	0.42	-0.35
August	0.09	0.03	0.24	-0.24
October	0.79**	-0.82**	0.73*	-0.47

*correlation values are significant at 0.05 probability level

** correlation values are significant at 0.01 probability level

The density of *B. tabaci* nymphs exhibited a notable correlation with the planting date, as observed in the study. Specifically, the earliest planting date, which occurred on March 15th, resulted in the lowest population of *B. tabaci* nymphs during both seasons. The recorded densities were 7.35 and 6.94 nymphs per square inch, respectively. Conversely, cucumber plants cultivated with the widest planting space of 40 cm experienced the highest infestation rates of *B. tabaci* nymphs, reaching 7.50 and 6.21 nymphs per square inch in the two seasons, respectively (Mohamed, 2012).

B. tabaci was the most abundant on squash plants in August plantation of 2014 and 2015 seasons, followed by June and then March plantations (Awadalla et al ., 2018). *B. tabaci* population was higher in autumn plantation than in summer plantation in cucumber during 2014 and 2015 (Saleh et al., 2017). The population of whitefly, *B. tabaci* on cucumber plants and found the highest population in October (Abd El-Hady et al., 2014). The population of *B. tabaci* increased in autumn more than spring season on cucumber crop (Pan et al., 2015). While, (El-Sayed et al., 1991). Found that, in all plantations, cucumber was the heavily infested plant with *B. tabaci*. The seasonal abundance and the distribution pattern of whitefly, *B. tabaci* on cucumber plants in sandy newly reclaimed land, during the late summer for two successive years (2002 and 2003). The population density of *B. tabaci* raised the maximum in October and November (Abd El-Khalek, 2005).

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CONCLUSION

The results revealed that August sowing date recorded the highest percentage of *B. tabaci* dominance during the two years 2018 and 2019. March sowing date recorded the lowest percentage of *B. tabaci* dominance during the two years 2018 and 2019.

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CONFLICTS OF INTEREST

"The authors declare no conflict of interest".

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