

Mona maghraby



بسم الله الرحمن الرحيم

مركز الشبكات وتكنولوجيا المعلومات

قسم التوثيق الإلكتروني



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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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**Efficiency of Modern Methods for Controlling
Some Vegetable Pests in Greenhouses
in Egypt and Morocco**

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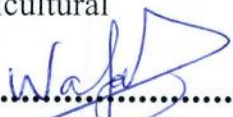
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This research was carried out at Mubarak center for protected cultivation located at Gizeret El-Dahab area, Giza Governorate during two successive seasons (2005-2006 and 2006-2007). The main objective of this experiment was investigating certain methods that could reduce the population density of certain vegetable pests; whitefly (*Bemisia tabaci*) (adults, nymphs and egg), aphid (*Aphis gossypii*), thrips (*Thrips tabaci*) and the red spider mite (*Tetranychus urticae*), on cucumber plants inside the greenhouses. To achieve these objectives, two cucumber greenhouses groups as well as two open field areas were chosen. Each group consists of 3 greenhouses; three different treatments were applied in these greenhouses, covering the doors and ventilation holes with insect proof, applying the repellent substances, and the control without any treatments. The first group was facing non treated open field and the second group was facing the treated open field. Suitable pesticides to the pest infestation were applied in the treated open field. In the other open field no pesticides were used on the cultivated plants. Plant leave samples were examined weekly till the end of the growing season. Generally, the total population number of whitefly (with its three studied stages) in the autumn season was higher than that in the spring season in contrast to the other three studied pests. Controlling these pests outside greenhouses reduced its numbers inside the greenhouses. Covering the greenhouses with insect-proof screens as physical barriers was imposed by the severe outbreaks of whitefly, aphid and thrips numbers, which might protect cucumber from infection by virus and reduce chemicals pesticides usage on covered vegetable crops. On the other hand, repellent substances were effective in reducing greenhouse infestation by aphids and thrips but not effective with the other two studied pests.

Generally, to reduce the harmful effect of the four studied pests on cucumber plants in greenhouses it is recommended to use the repellent substances combined with one or more controlling method that affects these four studied target pests on the surrounding open field plants. Covering the greenhouses opening ventilations with the insect proof would also reduce the pest immigration from outer cultivations to the greenhouse cultivations.

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1. INTRODUCTION

The term "greenhouse" is defined as a structure covered with a transparent or translucent material, in which environmental conditions can be modified or controlled, for plant cultivations. Greenhouse production is the only method of food crop production that gives the opportunity of controlling the environmental conditions. With the use of a greenhouse, it is possible to cultivate food-producing plants in locations and at times when climatic conditions would adversely affect them or even prevent them from growing. Also, greenhouses can be used to protect crops against weather phenomena (such as wind, excessive rain) that would negatively affect them.

Greenhouses are used to create and maintain an environment ideal for plants. However, this environment is often favorable for insects and pathogens too. In the past, the control of insects and diseases in greenhouses was accomplished with the use of pesticides, but over time both insects and diseases have developed resistance to such pesticides, while consumers have begun to demand pesticide-free produce.

In a previous study (Baiomy, 2001) the author surveyed the pests which attack the greenhouse cultivations in Gizzeret El-Dahab area during two successive seasons (1998-1999 and 1999-2000). The temperature inside the greenhouses varied between 19°C and 25 °C in autumn and from 22 °C to 35 °C in spring. These temperature ranges consider favorable for plant growth. In most cases these temperatures are also favorable for insects and mite development. These favorable conditions may led to pests' immigration into the greenhouses. The

author found that among the eight recorded pests, four pests considered the most harmful on cucumber plants. These pests were whitefly, aphid, thrips and the red spider mite.

Therefore, the current study has been carried out as an extension to the master study. The scope of this study was to contribute towards a better knowledge of the following aspects:

1. Decreasing the pest population infested vegetable crops under greenhouses.
2. Prevent immigration of major pests and animals (whitefly, aphid, thrips, and the red spider mite) from open field to vegetable crops in greenhouses.
3. Apply integrated pest management (IPM) to control the main pests of greenhouses.
4. Minimize chemical pesticides using against vegetable pests under greenhouses.

2. REVIEW OF LITERATURE

The world greenhouse area is currently estimated at approximately 310,000 ha, 40,000 ha of which is covered with glass, and 270,000 ha is covered with plastic. Vegetable crops are grown in about 65% of greenhouses, and ornamentals in the remaining 35%. In the past 24 years the surface areas with occupied with greenhouses have increased more than 100%, with an increase of 4.4% per year (Van Lenteren, 2000a and Bueno, 2005).

In Egypt, the limited water resources and rapid increase in population were the major factors that drew the attention towards the use of intensive - protected agriculture (Abou-Hadid, 1999). He mentioned that the total protected cultivation area was 19.822 ha and the major crops were pepper, tomato, cucumber, cantaloupe, bean, strawberry, and melon. In Morocco, the production under plastic greenhouses developed significantly reaching 6.500 ha. in 1998. Tomato was representing 53% of the total area while the rest was cultivated with potato and melon (Sedki *et al.*, 1999).

Yano, (1993) mentioned that one of the main greenhouse problems is the immigration of pests from the surroundings because of poor isolation from the outside environment.

Ajwang *et al.* (2002) revealed that the Insect proof screens are being used for Integrated Production and Protection (IPP) in greenhouses. Moreover, the avoidance of chemical applications in plant production is one of the ultimate aims of IPP systems. With respect to pest management, biological control, climate control and the use

of physical barriers such as insect proof screens on ventilation inlets and doors are increasingly becoming a major component of IPP systems for greenhouses. They added, three main reasons have contributed to this development. Firstly, the acquisition of resistance to pesticides has made insect control very difficult in greenhouses. Secondly, environmental and health problems associated with pesticides have sensitized greenhouse workers to pesticide issues. Lastly, insect pests are the vectors for some viruses. Insect proof screens are therefore used to reduce human exposure to pesticides, exclude or eliminate disease-causing insects, slow the build-up of pesticide resistance and conserve the usefulness of pesticides.

At present, in areas with a high density of greenhouses, where high losses can be incurred due to the activity of insects, the use of insect proof screens is compulsory (Valera *et al.* 2006). The using of insect-screened reduced the pests' immigration by approximately 12 times and loss rate of crops had also to be reduced by approximately 25% compared with the control plots (Holt *et al.*, 2008).

Greenhouse pests

The enlargement of area in which some horticultural plants are grow in outdoor (cucumber, tomatoes) and in the greenhouses (tomatoes, cucumber and aubergine) is accompanied by an increasing and quite regular occurrence of some pests, such as greenhouses whitefly; (*Bemisia tabaci*), the two spotted spider mite (*Tetranychus urticae*), thrips (*Thrips tabaci*), and aphid (*Aphis gossypii*, and *Myzus persicae*) (Milevoj and Osvald, 1996).

Tomato whitefly; *Bemisia tabaci* (Genn.)

Even though *B. tabaci* Gennadius was probably originated in India or Pakistan (Mound, 1983) it was described from Greece (Gennadius, 1889). (Gerling, 1996) cleared that the presence of *B. tabaci* in the Mediterranean countries has been well established throughout this century. Although it's known as a severe pest mainly in the eastern part of the Mediterranean, it became a pest in the western part only recently, probably with the introduction of infested material from the new world. *B. tabaci* is a pest both in greenhouses and outdoors. In greenhouses it may occur year round and mainly affects vegetables and flowers, both as a virus transmitter and as a direct pest (sooty mold production and plant sucking). Outdoors it is a major pest of summer crops such as cotton, vegetables, and ornamentals. Also; it has been a more severe pest in the warmer, eastern basin of the Mediterranean. Verma (1963) reported that, at least 23 viral diseases transferred by the whitefly. Vet *et al.* (1980) and Oliveira *et al.* (2001) mentioned that whitefly; *B. tabaci* is an economically important pest on many economic plants in different parts of the world. It is commonly encountered as serious pests of various crops both in the field and greenhouses.

Whitefly transfers plant diseases during feeding by sucking the plant juice. In southern Spain the whitefly; *B. tabaci* is a key pest transmitter for two types of tomato yellow leaf curl virus (TYLCV), as well as tomato chlorosis virus (ToC), (Navas-Castillo *et al.* 2000, Stansly *et al.* 2004). In addition to damage caused by direct feeding pressure, whiteflies transmit plant viruses such as the *Lettuce infectious*

yellow virus (Fasulo, 2005).

Tunc *et al.* (1983) recorded whitefly on 47 species of plants (including those used as winter shelters and true food plants) during the study period (1975-1977) in Turkey. They mentioned that the whitefly was able not only to survive but also to feed and multiply on some of the alternative food plants. From early March whitefly adults were able to fly from the winter shelters to its hosts the vegetables plants. In Lebanon, studies in both field and greenhouse were conducted to determine the host preferences of *B. tabaci* on cucumber, tomato, pepper and okra. The number of whitefly immature stages was highest on cucumber for both crops grown in the field and in the greenhouse. Roditakis *et al.* (2005) mentioned, *B. tabaci* gradually became a very harmful pest for greenhouse tomato, cucumber and eggplant crops as well as open field crops (in the island of Crete).

Gerling *et al.* (1986) said that the sex ratios in Israeli favor the females in spring and early summer and in the autumn, males predominate. In India, males predominate from March to July, whereas in Egypt, females predominate year round.

Under Egyptian conditions, El-Sayed *et al.* (1991) studied the population dynamics of the immature stages of whitefly on 15 food plants during summer and winter seasons. They found that cucumber was the most infested food plants in all seasons. These results were confirmed by El-Khayat *et al.* (1994) who studied the relative population density of whitefly; *B. tabaci* on leaves of 5 summer and 5 winter vegetable crops at 2 locations in Qalubia Governorate.

Ali (1993) and Salem (1993) observed that the