

ORIGINAL ARTICLE

Study of the Pest Insects in Plastic Houses

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ABSTRACT

In current study, 9 species of the pests associated with vegetables in greenhouses, were collected from different region of Iraq are investigated. These species belonging to 7 genera, 6 families and 4 orders were determined; these species are: *Aphis craccivora* Koch, *Aphis fabae* Scopoli, *Aphis gossypii* Glover, *Myzus persicae* (Sulzer), *Bemisia tabaci* (Gennadius), *Tuta absoluta* (Meyrick), *Dacus ciliates* Loew, *Liriomyza sativa* Blanchard and *Occathemus tarsalis* (Mulsant). The species of tomato leafminer *Tuta absoluta* most abundant in greenhouses compared to other species.

Key words: Aphids, Greenhouses, Iraq, Leafminers, Pest, Whitefly.

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INTRODUCTION

The greenhouses or plastic houses are instruments which can be used to facilitate the growing of plants, and provide a shelter in which a suitable environment is maintained for plants. In Iraq, the use of greenhouses or plastic houses is becoming widely in all areas; among those vegetables, which is famous within the greenhouses are: cucumbers, tomatoes, eggplants and green peppers. Insects can gain entrance into the greenhouse or plastic house through vents, doorways, openings in the greenhouse, and even on clothing and equipment. Regular plant inspections are important for immediate and effective control [1].

On tomato, there are several insect species feed on this crop for examples: thrips, whiteflies, tomato fruitworms, leaf miners, leafhoppers, aphids, mites and mealybugs [2]. Recently, the tomato leafminer, *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae) is one of the most devastating pest of tomato crops [3]; this newly introduced pest spread rapidly throughout the tomato growing areas in greenhouses and open field, and is now well established in Iraq. The larvae of *T. absoluta* can completely destroy the tomato canopy by mining leaves, stems and buds and burrowing tunnels in the fruits, causing unmarketability of fresh tomato and yield losses up to 100% [4].

Cucumbers the second crop grows in plastic house in Iraq, and also the aphids are commonly encountered in greenhouse growing situations [5], and are able to transmit a number of viruses that affect cucumbers [6].

According to above; this study was proposed to survey of insect inside the greenhouses in some areas of Iraq.

MATERIALS AND METHODS

The specimens of insects were collected from greenhouses during 2015 at different regions of Iraq. Some of the specimens were collected as leaf miners from the greenhouses of cucumbers, eggplants, Tomatoes, peas, green papers, many leaves of infested plants were kept in Petri dishes under lab temperature until the adults emerge, and the infested fruits were collected such as others as damaged of fruits as fruit flies. Aphids were collected from their host plants with a fine brush and put into tubes which contained 70% alcohol. Leafminer or *Tuta absoluta* was collected by two methods, larvae and adults: the larvae were obtained by collected the infested the fruits and leaves, and the adults were collected by using sticky traps that have already been installed inside the plastic houses (Figure.1).

Finally, the adults and nymphs of whiteflies were collected by aspirators and leaves infested respectively, then transferred to laboratory to identify it.

Many different keys were used to diagnostic the specimens such as: [7-22]. In addition, the insects were compared with identify specimens and stored in the Iraq Natural History Research Center and Museum, University of Baghdad.

RESULTS AND DESCUSSION

There were 9 species belong 7 genera, 6 families and 4 orders, were collected during these investigations. This study has shown through field observations, the species of *Tuta absoluta* is the most common, while species of *Occathemus tarsalis* least presence in plastic houses.

These species as follow:

1- Order: Hemiptera

Family: Aphididae

Aphis craccivora Koch, 1854

The specimens were collected from *Melilotus* sp. (Family; Fabaceae), members are known as common grassland plants in plastic houses. Because this species is polyphagous and not restricted on Fabaceae (23) and presence inside the plastic houses in current study, and so we expect it will move to other host plants. Although this aphid species is very polyphagous, feeding on as many as 80 plant families, it appears to have a preference for the family Fabaceae.

Materials examined: on *Medicago* sp. Baghdad, Jaddria 22.02.2015, Madaen 23.12.2008. Wasit, Al Aziziyah 02.05.2015.

Distribution: Worldwide distribution [24, 25].

Aphis fabae Scopoli, 1763

In this species the specimens were collected from *Chenopodium* sp. and *Beta vulgaris* Linnaeus in plastic houses. The important of *A. fabae* or the black bean aphid became from this species can feed on a wide variety of host plants (about 60 plants) such as: *Papaver* sp., *Humulus lupulus* L., *Amaranthus retroflexus* L., *Spinacia oleracea* L., *Capsella bursa-pastoris* (L.), *Cardaria draba* (L.), *Brassica oleracea* L., *Armoracia rusticana* Gaertn., *Raphanus sativus* L., *Cucumis sativus* L., *Cucurbita pepo* L., *Cucumis melo* L., *Citrus lanatus* (Thunb.), *Solanum tuberosum* L., *Solanum nigrum* L., *Lycopersicon esculentum* Mill., *Capsicum annum* L. (26). So that, this species may very important to damage of plants and moving from one plant to another, according to environmental conditions.

Material examined: on *Beta vulgaris*: Baghdad, Jaddria 18.04.2015. On *Chenopodium* sp.: Wasit, Al Aziziyah, 25.02.2015.

Distribution: Europe, Asia, North America, cooler parts of Africa, Middle East and South America [27].

Aphis gossypii Glover, 1854

This aphid is the most important species that occur as economic pests on greenhouse vegetable crops [28]; in our investigations the aphids were collected from *Lycopersicon esculentum*, *Solanum melongena* Linn. and *Cucumis sativus*; also some of the specimens were collected from *Plantago* sp. plant. Waterhouse [29] was assured that cotton aphid is widely polyphagous

Material examined: on *Lycopersicon esculentum* Baghdad, Jaddria and Abu Ghraib, 3.4.2015 and 25.04.2015; Wasit, Al- Zubaidiya 2.5.2015. On *Cucumis sativus* Baghdad, Jaddria 10.02.2015, Baghdad, Taji 08.03.2015, Baghdad, Jaddria 15.03.2008; on *Plantago* sp. Baghdad, Taji 08.03.2015. On *Solanum melongena* Baghdad, Jaddria 29.01.2008, Baghdad, Madaen 25.03.2015.

Distribution: widespread throughout warm temperate, subtropical and tropical regions of the world [29].

Myzus persicae (Sulzer, 1776)

According to [28], this species also important in greenhouse. In current study the specimens were collected on *Lycopersicon esculentum*, *Solanum melongena*, *Cucurbita* sp. and *Malva* sp.

Family: Aleyrodidae

Bemisia tabaci (Gennadius, 1889)

Bemisia tabaci or silverleaf whitefly, is collected in high density from peppers *Capsicum annum* L. and less from eggplants, *Solanum melongena* Linn. and cucurbits *Cucumis sativus* Linnaeus respectively. Stansly and Natwick [30] listed host vegetables and which were the hosts for this species: tomato, beans, pepper and cucurbits in greenhouses.

Material examined: on *Capsicum annum*: Baghdad, Jaddria 03.04.2015 and 18.4.2015; Wasit, Al Zubaidiya 02.05.2015. On *Cucumis sativus*: Baghdad, Jaddria 10.04.2015, and 20.4.2015; Madaen, 22.04.2015; Taji 08.03.2015. On *Solanum melongena*: Baghdad; Jaddria 29.03.2015; Madaen 25.04.2015. Wasit; Al Aziziyah 02.05.2015; Al Zubaidiya 14.03.2015.

Distribution: widespread in Europe, Asia, Africa, Oceania, North, South and Central America [31].

2-Order: Lepidoptera

Family: Gelechiidae

Tuta absoluta (Meyrick, 1917)

In our investigation, the tomato leafminer is more abundant compared with another pests in current study inside plastic houses; the specimens were collected in two stages, larvae on fruits of *Solanum Lycopersicum* Linn. (= *Lycopersicon esculentum* Mill.) and adults that captured by sticky traps (Figure. 1). This pest is considered as a limiting factor for tomato production all over the world, accounting for about 70% of the plants losses, due to being damage by the larvae of this pest [17].

Materials examined: in fruits and leaves of tomato, Wasit, Al Zubaidiya 2.05.2016, Az Aziziyah, 07.06.2015.

Distribution: South America [32]; Italy, France, Malta, United Kingdom, Greece, Switzerland, Portugal, Morocco, Algeria, Tunisia, Libya and Albania [32, 33, 34, 35, 36], Iraq [3]

3-Order: Coleoptera

Family: Cantharidae

Occathemus tarsalis (Mulsant, 1862)

Synonym: *Cantharis tarsalis* Mulsant [37]

The adults of this species were seen feeding on leaves and buds of *Cucumis sativus*, but it was a few specimens.

Material examined: on cucurbits: Wasit; Al Aziziyah and Al Zubaidiya 14.3.2015.

Distribution: Iraq [38]; Italy, Turkey, Cyprus, Iran and Syria [39].

4-Order: Diptera

Family: Agromyzidae

Liriomyza sativae Blanchard, 1938

The vegetable leafminer, *Liriomyza sativae* Blanchard, Vegetable leafminer attacks a large number of plants, but seems to favor those in the plant families Cucurbitaceae, Leguminosae, and Solanaceae. Stegmaier [40] reported nearly 40 hosts from 10 plant families in Florida. Among the numerous weeds infested, the nightshade, *Solanum americanum*; and Spanish needles, *Bidens alba*; are especially suitable hosts in Florida [41]. Vegetable crops known as hosts in Florida include bean, eggplant, pepper, potato, squash, tomato, and watermelon. In California, Oatman [42] reported a similar host range, but also noted suitability of cucumber, beet, pea, lettuce and many other composites. Celery is also reported to be attacked.

The potential impact of the mining activity is evident from the work of [43], who studied the value of treating squash with insecticides in California. These authors reported 30 to 60% yield increases when effective insecticides were applied, but as is often the case with leaf miners, many insecticides were not effective.

Materials examine: The leafminers were collected from cucumber infested leaves in green house at 22.4.2015 in Baghdad, Jaddria. Wasit, AL Aziziyah at 16.3. 2015.

Distribution: in Asia: Iraq [44], Bangladesh [45]; China, Japan, India, Iran, Jordan and Palestine [46]; Oman [47]. Africa: Egypt and Sudan [48]; Yemen and Turkey [46].

Family :Tephritidae

Dacus ciliates Loew, 1862

Dacus ciliates, is called, Ethiopian fruit fly, cucumber fruit fly, The cucurbits are the principal hosts, with several other crops apparently of less importance such as; Fabaceae, Solanaceae, Malvaceae, and Rosaceae [19]. Adult female had a strong ovipositor to pore the skin of fruit and laid the eggs the larvae of this species develop in the fruits, the pupae at soil, after 2-4 weeks the adult emerged [49].

Materials examined:

The specimens were collected from infested and signed of ovipositor pores *Cucumis sativa* at 14.3. 2015 Wasit, Al Zubaidiya; Baghdad, Jaddria 22.7 2015.

Distribution: Iraq (50); Palestine, Jordan, Saudi Arabia, Yemen [51], Oman [14, 52]. Bangladesh, India and Iran [46]. Africa: from Egypt to South Africa [49] and its native in east Africa [53].

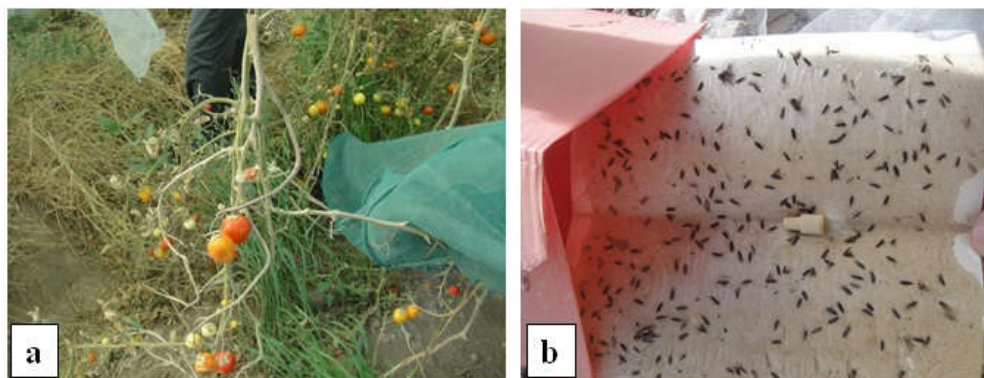


Figure (1) a- fruits of tomatoes infested by larvae of *Tuta absoluta*
b- Adults of *T. absoluta* captured by white sticky traps

REFERENCES

- Dickerson, G. S. 1996. Greenhouse Vegetable Production. Cooperative Extension Service, Circular 556, College of Agriculture and Home Economics. New Mexico State, 9pp.
- EPPO. (2010). List of biological control agents widely used in the EPPO region. [http:// archives.eppo.org/ EPPOStandards/ biocontrol_web/bio_list.htm](http://archives.eppo.org/EPPOStandards/biocontrol_web/bio_list.htm).
- Abdul Razzak, A.S.; Al-Yasiri, I.I. and Fadhil, H.Q. (2010). First record of tomato borer (tomato moth) *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae) on tomato crop in Iraq. Arab and Near East Plant Protection Newsletter. No. 51: 31.
- Viggiani, G.; Filella, F.; Ramassini, W. and Foxi, C. (2009). *Tuta absoluta*, nuovo lepidottero segnalato anche in Italia. Informatore Agrario, 65 (2): 66-68.
- Lee, J.M. (1994). Cultivation of grafted vegetables. 1. Current status, grafting methods, and benefits. HortScience, 29:235-239.
- Matthews, R. E. F. (1991). Plant virology, 3rd ed. Academic Press, San Diego, CA.
- Bezzi, M. (1915). On the Ethiopian fruit flies of the genus *Dacus*. Bull. Entomol. Res., 6:85 - 101.
- Joy, N.H. (1932). A practical handbook of British beetles. Two volumes. H.F. & G. Witherby. Reprinted in slightly reduced format in 1976 by E.W. Classey Ltd, Faringdon.
- Efflatoun, H. C. (1924). A monograph of Egyptian Diptera. Part II. Fam. Trypanidae. Mem. Soc. R. Entomoml. Egypte, 2 (2):132 pp.
- Crowson, R. A. (1956). Coleoptera: Introduction and keys to families. Handbooks for the identification of British insects, 4(1): Royal Entomological Society of London, 59pp.
- Spencer, K. A. (1972). Diptera: Agromyzidae. Handbooks for the identification of British insects, 10 (5): Royal Entomological Society of London, 136pp.
- Spencer, K. A. (1981). A revisionary study of the leaf-mining flies (Agromyzidae) of California. University of California, Division of Agricultural Sciences. Special Publication, 3273: 1-489.
- Spencer, K. A. and Steyskal, G. C. (1986). Manual of the Agromyzidae (Diptera) of the United States USD Agriculture Handbook, 638:478Pp.
- White, I. M. and Elson - Harris, M. M. (1994). Fruit flies of Economic significance. Their identification and bionomics. CAB. International, UK. 608 Pp.
- Choate, P. M. (1999). Introduction to the Identification of Beetles (Coleoptera), Dichotomous Keys to Some Families of Florida Coleoptera, 23-33.
- Choate, P. M. (2003). Beetles, Identification of beetles, Dichotomous Keys to Some Families of Florida Coleoptera, 12Pp.
- Svihla, V. (1999). Contribution to the knowledge of the genus *Cantharis* L. and related genera from Turkey and adjacent regions (Coleoptera, Cantharidae). Entomologica Basiliensia, 21: 135-170.
- Aluja, M. and Norrbom, A. L. (2001). Fruit flies (Tephritidae) Phylogeny and evolution of behavior. CRC Press, 963Pp.
- Carrol, L. E.; White, I. M.; Friedberg, A.; Norrbom, A. L.; Dallwitz, M. J. and Thompson, F. C. (2002). Pest fruit flies of the World: Descriptions, Illustrations, Identifications, and Information Retrieval. Version: 8th August, 2002. <http://www.sel.barc.usda.gov/diptera/tephritidae/pests/adults>
- Kapoor, V. C. (2005). Taxonomy and biology of economically important fruit flies of India. Biotaxonomy of Tephritoidea. Isr. J. Entomol, 35- 36(6):459 - 475.
- Ali, H. B. (2010). Taxonomic study on Subfamily: Aphidinae (Homoptera: Aphididae) on herbaceous plants and shrubs in Iraq. Ph.D. Thesis in Science /Biology, Zoology/ Insects Taxonomy. College of Science, Baghdad University.
- Al - Saffar, H. H. (2011). Taxonomic study of Fruit flies Family: Tephritidae (Insecta: Diptera) from some Governorates of Iraq. Ph.D. Thesis in Science /Biology, Zoology/ Insects Taxonomy. College of Science, Baghdad University, 179Pp.

23. Blackman, R.L. and Eastop, V.F. (2007) Taxonomic Issues Pp. 1-29. In: van Emden, V.F. and Harrington, R. (Eds) *Aphids as Crop Pests*. CAB International, Wallingford, 1-29.
24. CIE. (1983). Distribution Maps of Plant Pests, No. 99. Wallingford, UK: CAB International.
25. Blackman, R.L. and Eastop, V.F. (2000). *Aphids on the World's Crops*, Second Edition. John Wiley & Sons with the Natural History Museum, London. x + 466 Pp.
26. Gotlin Čuljak, T.; Grubišić, D.; Mešić, A.; Juran, I. (2012). List of aphids (Homoptera: Aphidoidea) and their host plants in Croatia .Natura Croatica: periodicum Musei Historiae Naturalis Croatici, 21 (1): 191-221.
27. Holman, J. (2009). Host Plant Catalog of *Aphids*, Palaearctic Region. Springer Science and Business Media B.V. 1216 Pp.
28. van Lenteren, J. C. and Woets, J. (1988). Biological and integrated pest control in greenhouses. Ann. Rev. Entomol., 33:239-269.
29. Waterhouse, D.F. (1998). Biological Control of Insect Pests: Southeast Asian Prospects. ACIAR Monograph, No. 51, 548 Pp.
30. Stansly, P. A. and Natwick, E. T. (2010). Integrated Systems for Managing *Bemisia tabaci* in Protected and Open Field Agriculture. In: Stansly, P. A. and Naranjo, S.E.(eds.) *Bemisia: bionomics and management of a global pest*.
31. EPPO. (2005). Datasheet *Tuta absoluta* datasheet. OEPP/EPPO Bulletin 35: 434-435.
32. EPPO. (2008). Additional information provided by Spain on EPPO A1 pests. EPPO reporting service (ESTa/2008-01).
33. EPPO. (2008). First record of *Tuta absoluta* in Algeria. EPPO reporting service 2008/135.
34. EPPO. (2008). First record of *Tuta absoluta* in Morocco. EPPO reporting service 2008/174.
35. EPPO. (2009). First report of *Tuta absoluta* in France. EPPO reporting service 2009/003.
36. EPPO. (2009). First report of *Tuta absoluta* in Tunisia. EPPO reporting service 2009/042.
37. Kazantsev, S. (2013). *Occathemus Svihla*, 1999. Accessed through: Fauna Europaea at http://www.faunaeur.org/full_results.php?id=103885 (Version 2.6.2).
38. Derwesh, Al. (1965). A preliminary list of identified insects and arachnids of Iraq. Director General Agriculture Research Projections Baghdad, Bulletin, no.12: 121-123.
39. Fanti, F. (2014). Catalogo critico delle Cantharidae d'Italia (Insecta, Coleoptera). Memorie Soc. Entomol. Ital., 91 (1-2): 61-132.
40. Stegmaier, C. E. (1966). Host plants and parasites of *Liriomyza munda* in Florida (Diptera: Agromyzidae). Florida Entomologist 49: 81-86.
41. Schuster, D.J.; Gilreath, J.P.; Wharton, R.A. and Seymour, P.R. (1991). Agromyzidae (Diptera) leafminers and their parasitoids in weeds associated with tomato in Florida. Environmental Entomology, 20: 720-723.
42. Oatman, E.R. (1959). Host range studies of the melon leaf miner, *Liriomyza pictella* (Thomson) (Diptera: Agromyzidae). Annals of the Entomological Society of America, 52: 739-741.
43. Sharma, R.K.; Durazo, A. and Mayberry, K.S. (1980). Leafminer control increases summer squash yields. California Agriculture, 34: 21-22.
44. Abdul- Rassoul, M. S. and Al Saffar, H. H. (2014). Parasitoid of the genus *Liriomyza* Mik. In Iraq. Int. J. Curr. Microbiol. App. Sci., 3(5): 618-624
45. Santosh, M. and Bhuiya, B. A. (2014). Vegetable leafminers (Diptera: Agromyzidae) and their plant hosts in Bangladesh. Journal of Threatened Taxa, 6(6):5894-5899.
46. EPPO. 2014. PQR database .Paris France: European and Mediterranean Plant Protection Organization. <http://www.eppo.int/DATABASE/pqr/pqr.htm>
47. Deeming, J.C. (1992). *Liriomyza sativae* Blanchard (Diptera: Agromyzidae) established in the Old World. Tropical Pest Management, 38(2):218-219
48. Martinez, M. and Bordat, D. (1996). Note sur la présence de *Liriomyza sativae* Blanchard (Diptera, Agromyzidae) au Soudan et au Cameroun. Bulletin de la Société Entomologique de France, 101(1): 71-73.
49. Hancock, D. L. 1989, Pest status, Southern Africa. IN:Robinson ,A. S. and Hooper, G.(eds), fruit flies : their biology ,natural enemies and control.WorldCrop Pests, 3(A),51-58.Alsevier,Amestrdam.
50. Moanas, A. M. H. and Abdul - Rassoul, M. S. (1989). First record of *Dacusciliatus*Loew (Diptera : Tephritidae) as a pest of cucumber in Iraq. Bull. Iraq Nat. Hist. Mus., 8 (2): 173 - 174.
51. Norrbom, A. L.; Carrol, L.E.; Thompson, F. C.; White, I. M. and Freidberg, A. 1999. Systematics database of names. In: Thompson, F.C., ed. Fruit flies expert identification system and Systematic information database. Myia 9. Backhuys Publishers, Leiden, 65-299 Pp.
52. Azam, K.M.; Al-Ansari, M.S.A.; Al- Raaesi, A.A. (2004). Fruit flies of Oman with record of *Carpomya vasuviana* Costa (Diptera: Tephritidae). Research on Crops, 5(2/3):274-277.
53. Vayssières, J.F. and Dal, F. (2002). Responses of the Ethiopian fruit fly, *Dacus ciliatus* Loew (Diptera: Tephritidae), to coloured rectangles, spheres and ovoids. In: Proceedings of the 6th International Symposium on fruit flies of economic importance, Stellenbosch, South Africa, 6-10 May 2002 [ed. by Barnes BN], 111-116.

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