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Natural enemies of *Bemisia tabaci* (Hemoptera, Aleyrodoidea) at Biskra crop area in south of Algeria

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ABSTRACT

The present study is focused on valuation of arthropods' population, Bemisia tabaci natural enemies, in biologic station of El Outaya in region of Biskra Algerian south. Monitoring of this arthropod fauna brings out thirteen species: belonging to ten distinct families, a spider of the Salticidae family represented by Salticus gender. As fo the nine families of insects, they are particularly represented by Miridae with majoritary species as Nesidiocoris tenuis Macrolophus caliginosus and Malacochoris sp. Anthrocoridae are represented only by Anthocoris sp. Among parasitoids Hymenoptera we find three families represented by Aphelinidae with Aphelinus and Encarsia sp. Ichneumonidae are represented by a Hymenopetran's gender as Dibrachys sp and a Platygasteridae one represented by Amitus sp. As for others families we note Coccinellidae mainly represented by Adalia bipunctata.. We also note a Chrysopidae represented by the major species Chrysoperia carnea. As for Dermapters we point out specie of Forficula auricularia. A predator Mantidae was also found as Iris oratoria.

Keys words: natural enemies, arthropods, *Bemisia tabaci*, biological station

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INTROUCTION

Bemisia tabaci, more commonly called white fly, has been described in Greece for the first time in 1889. Its original area would be Indian peninsula, although that point remains still discussed with a possible area of African origin [1](Oliviera *et al.*, 2001). Presence of this pest seems having been reported in all continents, except in Antarctic.

It is concerned by more than 900 host plants and it would transmit more than 110 different viruses. For long time, it is known on cotton tree, *Bemisia tabaci* is a very ravenous devastating, liable to pass easily enough from a culture to another [2] Able to reproduce with high speed and gifted of an extraordinary ability of adaptation into environment. So in 1991 and 1992 attacks of B.tabaci have occurred lost valuated to 500 millions of US dollars in United State of America, and 33 millions for melons and cotton growing in Mexico [3] In Brazil, considerable loss had been lost in tomatoes industry from 1997 to 2001 [1].

Those losses are induced by several types of direct damages; those which are straightly linked to insects' stings. Diet stings in vegetative organ influence reduction of gaseous exchanges and decrease of photosynthetic activity, Consequences are a yellowish plant, early leaf fall and growing reduction of fruit [1] Saliva injection during stings causes an irregular fruit mature called Tomato inhibitor Ripening (T I R) caused by ethylene excess [2] and forbid trading of those attacked fruit.

Currently *Bemisia tabaci*, is considered key pest in several countries and over the word (because of the direct damage caused by their feeding activity and the indirect damage linked to honeydew production, that supports the growth of sooty mold fungi, [4] At those damages, it is added transmission of viral diseases, major risk generated by

presence of this species type in greenhouse [5]. In Algeria to be able to fight this devastating, only chemical' fight seem to be efficient in consideration of its invasive characters, but insecticides use turns this specie more resistant [6] and often leads towards elimination of natural enemies of the white fly [7] [8] and too to environment [9].¨To can supervise this devastating without synthesis' insecticides disadvantages, it is interesting to find out others alternative methods in crop protection.

In order to have a better and knowledge of the auxiliaries entomofauna with this species and the most natural enemies of *Bemisia tabaci*, the present study was conducted in biological experimental station of El Outaya (South-East of Algeria), with the aim of establishing an effective IPM program against this bio aggressor.

MATERIALS AND METHODS

2.1 Study area

The Biskra province is a transition region between the northern and southern Algeria in items of morphological and bioclimatic (Figure, 1), located south east of Algeria between 36°55'36.6'' North and 005°38'56'' East, with arid to semi arid clima.

It covers a large area of over 21,671 km^2. This region satisfies almost important part of national fresh crop vegetables in Algeria. The study was carried out at the years 2011-2012 crop seasons. The site is located at El Outaya biological station it's covered about 22 ha, were the grower did not use chemicals for controlling pests in the fields. The area of each plot was 600 m^2, each field was divide on 6 aqual size plots.

Fig.1: Location of Biskra Province in Algeria

Fig.2: Location of sampled crop area at El Outaya station

2.2 Auxillaries sampling and identification

Entomofauna inventory has been realized during vegetative cycle of tomatoes from March to September at level of each season. Trap method of insects is constituted by the trap with yellow color + water for insects having aerial activity, and trap-pot or Barber traps to those having surface activity, and so threshing or banging and observation of the different organ on the spot, Insects' samples are held twice by month between 9 to 13 o'clock, harvested specimen are put in tubes bearing all details and containing alcohol at 70%.In laboratory, those ones will be classified by order to be determined with collaboration of Pr Doumandji S.E at the Entomological laboratory of national school of agriculture in Algiers.

RESULTS

Lecture of table 1 and figure3, emphasizes an important number of auxiliaries arthropods and insects at level of biologic station of El Outaya. Ten families have been reported which are nine belonging to insects' class and one (Table,1; Figure, 3 and 4) to Spiders class. Aranea are represented by only one family belonging to *Salticus* gender. The last one is the alone specie with total of 78 individuals. In total nine families belonging to insects class have been captured with an important species number represented mainly by homopterous order. Those last are recording the largest effective in numerical term, they are represented first by Miridae in majority with two species with the most important effective has been of 155 individuals for *Nesidiocoris tenuis*, followed by 130 individuals of *Macrolophus catiginosus* and 78 individuals for specie of *Malacochoris sp;* Anthocoridae are represented by only one specie with an effective relatively important which is 104 individuals represented by *Anthocoris sp.*

Table1 : Naturel ennemies found with *Bemisia tabaci* at Biskra crop area in south of Algeria

Ordres	Familles	Espèces
Aranea	Salticidae	*Salticus sp*
Coleoptera	Coccinellidae	*Adalia bipunctata*
Dermaptera	Forficulidae	*Forficula auricularia*
Homoptera	Miridae	*Nesidiocoris tenuis*
		Macrolophus caliginosus
		Malacochoris sp
	Anthocoridae	*Anthocoris sp*
Hymenoptera	Aphelinidae	*Encarsia sp*
		Aphelinus sp
	Ichneumonidae	*Dibrachys sp*
	Platygasteridae	*Amitus sp*
Mantodea	Mantidae	*Iris oratoria*
Nevroptera	Chrysopidae	*Chrysoperla carnea*

Among parasitoid hymenoptera we collect three families represented by Aphelinidae present with majority with 78 individuals belonging to family of *Ichneumonidae*, represented by an hymenoptera parasitoid *Dibrachys sp.* A Platygasteridae has been captured; it is represented by *Amitus sp* with 26 individuals only.

As for others families, we found Coccinellidae mainly represented by *Adalia bipunctata* with a total of 78 specimen. A predator Mantidae for more than 26 individuals of *Iris oratoria* is also represented with six individuals only.

We note two species of Chrysopidae It is about of 52 individuals of *Chrysoperla carnea* The Dermaptera group is also represented by 52species of *Forticula auricularia*

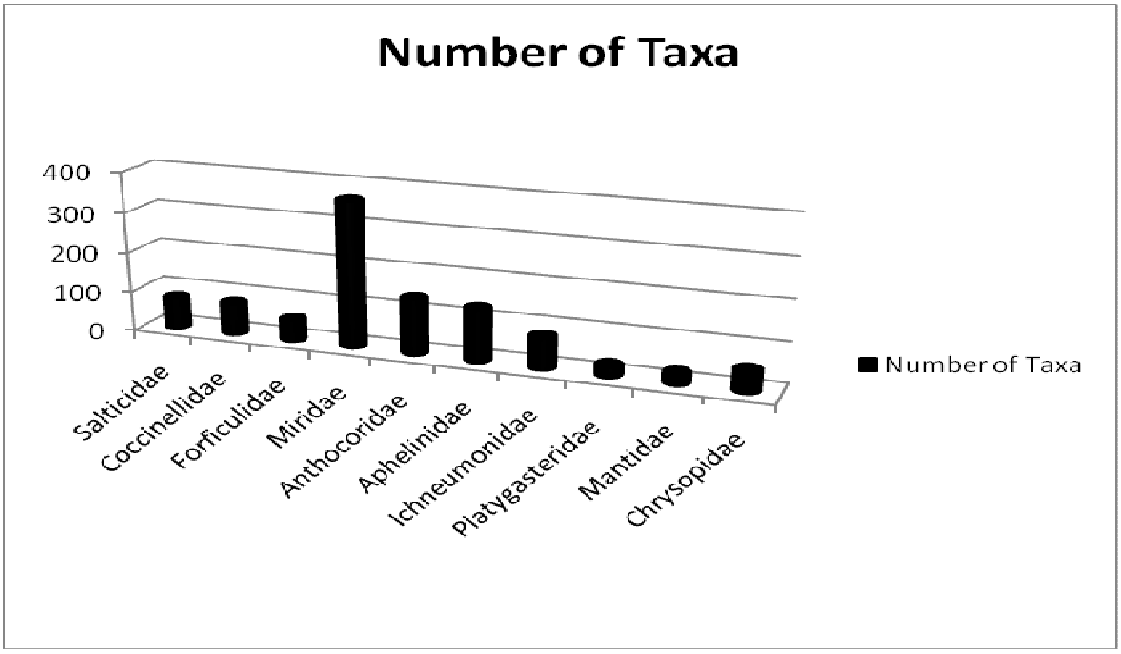

Figure 3 : Naturel ennemies families found with *Bemisia tabaci* at Biskra crop area in south of Algeria

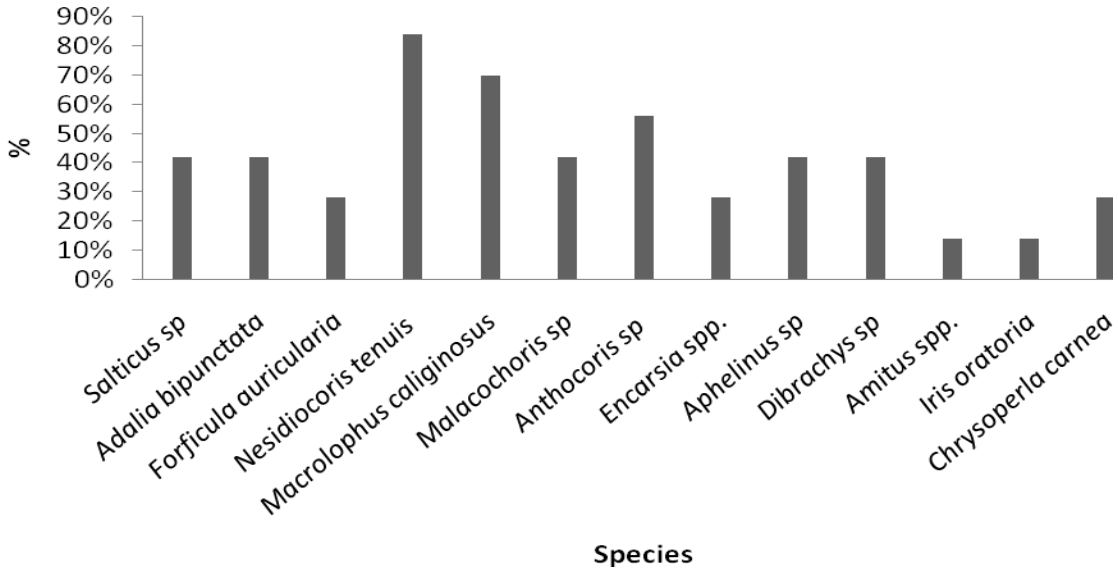

Figure 4: Auxillary species found with *Bemisia tabaci* at Biskra crop area in south of Algeria

DISCUSSION

Inventory of auxiliary arthropod fauna, shows a very rich species' diversity in biological station of El Outaya. Alghough the most of captured species are predators well known in the farming environment. Howerever these species are found under cultivation notably in presence of *Bemisia tabaci* [10] [11] that is in accordance with results obtained in wine growing environment for auxiliaries of the gren leafhopper, *Empoasca vitis* in south France [12] and *Jacobiasca lybica* in Algeria [13].

They are represented by a number relatively important of Coccinellidae, which are 78 individuals of one specie only *Adalia bipunctata*. Miridae are captured in large number within of this study, three species have been captured with a very interesting effectives. They are represented by *Nesidiocoris tenuis Macrolophus caliginosus* and *Malacochoris sp*, those last ones are observed too on foliage during sampling. Potential predators of the first category can devour larvae of aleurodes. A predator's bug of *Anthocoris* sp gender has been observed too. Those potential predators of first category can devour white flies bugs [14], [15], [16] first devastating of market gardening in the world.

Data show an important number of entomopahagous arthropods which are mostly polyphagous and predators with jumping spiders of S*alticus* gender this the last ones prove to be of large importance in the fight by natural antagonists against homopteren's species, notably for the gren leafhopper *Empoasca vitis* in some Mediterranean vineyards [12], [17] (Genini 2000 and Santenac 2005). During our sampling we have point out presence of a miridae bug of *Malacocoris* gender having also predator's activity on homoptera larvae.

We point out presence of four parasitoids of larvae, *Aphelinids* of *Encarsia* natural enemy very used in biological fighting programs [18].

Platygasteridae have been captured in presence of *Bemisia tabaci* in these area of south Algeria, with *Amitus sp* . Contrary to data relating to palm grove's arthropod fauna of Biskra region, no one of our species did not seem to be sampled during their inventories [19] On the other hand our data seem to be in accordance for the single species of Mantidae which has been observed, in Oasis Algerian south of Ouargla oases [20].

Others agents of biological fight could be identified as *Macrolophus caliginosus* as a potential predator bug, although few species have been studied for control of *Bemisia tabaci* except of *Encarsia formosa* Gahan, *Eretmocerus mundus* Mercet and *Eretmocetus d'Encarsia Formosa*. Gahan, *Eretmocerus mundus* Mercet and *Eretmocerus eremicus* Howard [21], [11].

Involvement of ecological reservoir zones in this richness at level of this station remains indisputable, for that reason, among useful arthropods populations and auxiliaries insects, a large part find refuge into those lodging [22], [23], [24].

CONCLUSION

The dynamic study of the auxiliary arthropod fauna at level of biological station of El Outaya station area allowed to highlighting a specific richness into that last one, inventoried arthropods effectives are relatively interesting and important into this station which remains under shelter of any pesticide use which can harm the auxiliary fauna. Generalization of such steps of biological instructions management will allow maintaining tolerable level of harmfulness of main bioagressors; this technique will allow a best management of population of this devastating in the frame of a lasting farming.

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