

COMMENTARY ARTICLE

Contribution to the knowledge of cereal crops entomofauna at Tissemsilt governorate (North West Algeria)

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An approach of the composition and structure of populations of different insect taxa found in cereal fields (durum wheat barley), in the Tissemsilt region. A fairly comprehensive list of the insect population by pot-barbers has highlighted a repertoire of 26 species. The order Coleoptera is the most encountered with 13 species, including 6 different families, five species are noted for the order Diptera divided into four families Muscidae, Syrphidae, Phoridae and Sarcophagidae. And to a lesser degree come Hymenoptera (6 species), Heteroptera (1 species) and Lepidoptera (1 species). In addition, the results reveal the existence of four harmful species (Curculionidae (02), Syrphidae, (1), Pentatomidae with only one species) and nine useful insects (Carabidae (04), Cicadellidae (1), Apidae (2) and Formicidae (2). This distribution is closely related to environmental factors such as precipitation, temperature and probably also to landscape elements, such as the cultivation in place, which directly influences the composition of the entomofauna.

Keywords: Cereals, Diversity, Entomofauna, Coleoptera, Tissemsilt.

Introduction

Cereal farming is a socio-economic pillar, cereals hold the first place in the world, in terms of occupation of agricultural land, ie 70% of the world's agricultural land is sown with cereals (Riley et al., 2009).

In Algeria, the areas reserved for cereals are around 06 million hectares. Each year 03 to 3.5 million hectares are sown, i.e., 70% is intended particularly for the cultivation of wheat and, to a lesser degree, barley. Durum wheat dominates cereal production in this area of the highlands, with a production exceeding one million quintals per year, barley ranks second, soft wheat and oats are rare. Cereal crops suffer seriously from infestation caused by various insect pests. Moreover, factors such as unfavorable weather conditions in recent years, changing cultivation patterns and global warming have led to the problems of emerging insect pests. Arthropod pests like insects are one of the important factors responsible for the decrease in wheat yield. They destroy approximately 18 to 26% of world agricultural production (Oerke and Dehne, 2004).

In Algeria, we find that there is very little information on harmful insects associated with cereal crops "durum wheat, soft wheat and barley", and even other groups of insects of ecological and economic importance such as auxiliaries.

Studies on the entomofauna of several cereal crops remain very insufficient, to our knowledge, there are only a few rare contributions made on both sides of the continent such as those of Chaabane (1993), Kellil (2011) and Hadj-Zouggar (2014) who inventoried the entomofauna of the three cereal crops at the same time, but for the three authors Madaci (1991), Mohand-Kaci (2001) and Berchiche (2004), they listed insects only on the wheat.

Therefore, through in this paper we present the preliminary data of cereal crop entomofauna. Our study aimed at assessing the composition and structure of populations of different insect taxa in cereal crop environment (Durum, Wheat and Barley), in Tissemsilt governorate for the purpose of developing phytosanitary management and predicting the potential for benefic arthropods in these agricultural environments little affected by insecticide pollution.

Materials and Methods

This study is carried out in a region of the highlands located in Tissemsilt, located at the foot of the Ouarsenis massif, and covers an area of 3,151.37 km², it is limited by Fig. 1.

1. To the north by the wilayas of Chlef and Ain defla.
2. To the West by the wilaya of Rélizane.
3. To the east by the wilaya of Médea.
4. To the south by the wilayas of Tiaret and Djelfa.

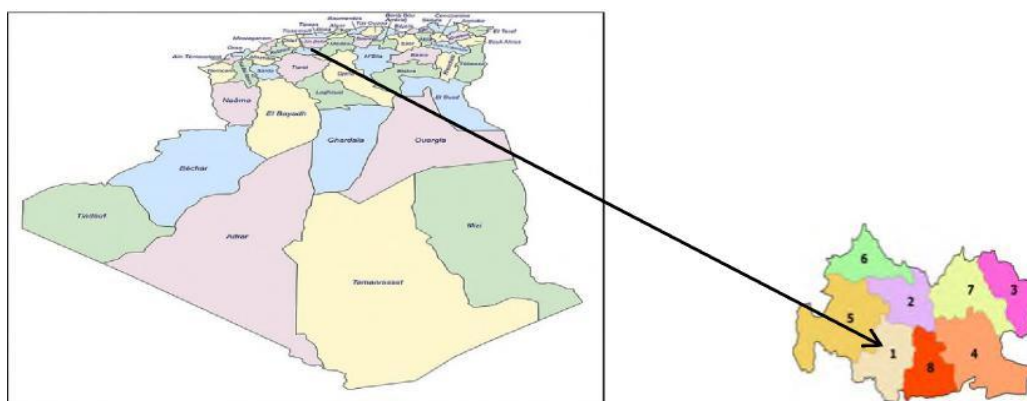


Fig. 1. Localisation of Tissemsilt governorate with their 8 localities: 1. Ammari, 2. Bordj Bou Naama, 3. Bordj El Emir Abdelkader, 4. Khemisti, 5. Lardjem, 6. Lazharia, 7. Theniet El Had, 8. Tissemsilt.

In our survey 02 stations were selected to the experimentation and installation of the insects traps. The following Table 1 presents the selected stations of cereal crops in place.

Table 1. Geographical location and information about cereal crop stations selected for the survey of insect at Tissemsilt governorate.

Stations	Plots	Geographical localisation	Varieties of cereal	Surface cultivated
Khmisti	P (1)	35°39'59"N 1°56'45"E	Durum wheat	15 ha
	P (2)	35°39'46"N 1°57'45"E	Barley	5 ha
Ammari	P (1)	35°34'51"N 1°37'31"E	Durum wheat	15 ha
	P (2)	35°34'27"N 1°32'03"E	Barley	20 ha

According to (Lamotte, 1969), the station must be as homogeneous as possible if we consider its soil, floristic, climatological and topographical characteristics. In order to analyze the spatial and temporal distribution of entomofaunistic populations and the abundance of insect populations. In order to know which invertebrates shelter on the cultivation of durum wheat and barley, our choice is to take two observation stations.

Investigations consist in collecting insects by using Barber traps, we placed 5 plastic pots 10 cm in diameter and 15 cm deep on the cereal plots, these pots are separated from each other by a distance of 20 m, filled to 2-3 of their contents with water added with a detergent which acts as a wetting agent.

The mowing net, this device consists in mowing, by horizontal and rapid back and forth movements, keeping the opening of the pocket perpendicular to the ground.

In the end, sight hunting is a hunting technique by which we captured all individuals seen on the ground, on all parts of the plants in place (cereals/and weeds).

We have conducted this investigation since Spring 2022 season (from March to June 2022). In the three months insect was collected once a week and conserved in alcohol 90° and then in Laboratory identification were supervised with Dr Abdelhamid and Dr Kaddouri M.A, we have used also references as like PERRIER (1927)a, PERRIER (1927)b, BERLAND (1999)a, BERLAND(1999)b-DAJOZ R.(1971), to confirm some species taxa.

Results

Table 2. Taxonomic richness of insect caught in Cereal Crop (Durum Wheat and Barley field) in Tissemsilt governorate since 2022 Spring season.

Orders	Families	Species	Station (HAS)		Station (B)	
			Durum wheat	Barley	Durum wheat	Barley
Beetles	Carabidae	<i>Bendium</i> sp	6	2	8	0
		<i>Bembidiin</i> sp	3	1	4	2
		<i>Poecilus</i> sp	2	0	4	0
		<i>Calathus</i> sp	2	0	0	4
	Silphidae	<i>Silpha granulata</i>	8	5	4	0
		<i>Silpha obscura</i>	8	0	3	2
		<i>Pimelia</i> sp	5	0	0	0
	Tenebrionidae	<i>Asida</i> sp	3	0	3	4
		<i>Pachychila</i> sp	4	0	2	1
	Curculionidae	<i>Otiorhynchus striatus</i>	2	0	10	0
		<i>Barynotus</i> sp	3	0	4	2
	Coccinellidae	<i>Coccinella septempunctata</i>	30	27	55	18
	Scarabidae	<i>Geotrogus desericola</i>	28	17	10	5
Muscidae	<i>Mesembrina</i> sp	15	7	22	5	
Syrphidae	<i>Musca domestica</i>	22	18	34	11	
Diptera	Phoridae	<i>Eupeodes corollae</i>	13	0	8	4
		<i>Phoridae</i> sp	35	18	11	6
	Sacrophagidae	<i>Sacrophaga muscaria</i>	6	0	2	0
		<i>Ceratini</i> sp	4	1	0	0
		Apidae	<i>Eucera longicomis</i>	2	0	1
Hymenoptera		<i>Aphaenogaster rudis</i>	1	0	0	1
	Formicidae	<i>Tapinoma magnum</i>	14	9	11	5
	Halictidae	<i>Halictus</i>	3	1	2	0
		<i>Lasioglossum</i> sp	4	0	2	1
Heteroptera	Pentatomidae	<i>Carpocorus mediteraneus</i>	2	0	0	0
Lepidoptera	Pieridae	<i>Pieris</i> sp	4	5	4	4

To: Khemisti B: Ammari.

The specific importance (in species) of all the insect orders (Table 2) in the overall inventory at our two study stations is equal to 28 species. Indeed in the first rank it is the stands of beetles that recorded 301 individuals during the entire study period, This category includes 6 different families and 13 species, we were particularly interested in the most harmful species *Geotrogus desericola* on the cultivation of durum wheat and barley, this pest displays a fairly large total of 60 individuals for the two study stations, on the other hand, we note the significant presence in terms of individuals at the level of the two crops of *Coccinella septempunctata* which plays a role in limiting the populations of certain pests.

The Diptera order at our two stations records a total of 237 individuals, belonging to four families; Muscidae, Syrphidae, Phoridae and Sacrophagidae. species *Musca domestica* is present in the two stations with a workforce equal to 75 individuals, comes in second place *Phoridae* sp, the latter shows a total number of 70 individuals, of which three individuals out of four are collected in the Ammari station.

The order Hymenoptera records a total of 61 individuals, belonging to three families: Apidea, Formacidae, and Halictidae. For six species. Species *Tapinoma magnum* is present in both stations with a workforce of 39 individuals, comes second *Iaso glossisp* with 08 individuals.

The order Heteroptera appears in the station of Ammari by a single family Pentatomidae and only one species *Carpocorus mediterraneus*, thus the order of Lepidoptera recorded in the two stations by a number of 17 individuals for a family and a single species.

Discussion

Examination of the entomofaunistic of cereals crops at Tissemsilt governorate shows a diversity of invertebrate species, in particular arthropods and particularly insects. A total number of 156 individuals for station (A), while at station (B), we were able to collect in the end 145 individuals belonging to 13 species and 6 families. The second order is that of the Diptera, divided into four different families.

The inventory of arthropods in agricultural environments can depend on several abiotic and biotic factors depending on the region, the latitude and other factors and the fluctuations in abundance are so varied from one region to another. These can be attributed to the effort of sampling and the time invested in it.

Our data, although relatively more important, can be comparable to those already reported in Tiaret, a region bordering our study area, or an entomological richness dependent on cereals of the order of 41 and 35 species reported respectively by Lebatche (2013) and Adamou-Djerbaoui (1993). However, we can compare our data with those of the inventories of the entomofauna linked to cereals.

Which have been carried out in various other cereal ecosystems in Algeria. Indeed, in the high plateaus of Sétif, El Kharoub, Kelil (2011) listed respectively 481 species on barley, 120 durum wheat and 197 soft wheat. Other authors include those of Madaci (1991) and Khafti (2018) who identified a richness of 26 and 107 species respectively in durum wheat and soft wheat. Further south in Biskra Barkoune (2020) listed 169 species on durum wheat, soft wheat and barley respectively. In revenge. in the Mitidja, Berchiche (2004) and Mohamed Kaci (2001) and Assabah (2011), mentioned a richness of 98 and 182 taxa on durum wheat.

In agricultural agroecosystem models, we are often confronted with so-called monoculture systems, which favor the establishment of bio-aggressors more than beneficial ones. The predatory role of these species is confirmed as generalist predators (Majot, 2000 and Genini, 2000). The results of this study also demonstrate the character of succession of the cereal biocenosis varies according to the phenological stage of the different varieties subject to this monitoring.

Conclusion

A knowledge as complete as possible of the entomofauna frequenting wheat and barley is essential. The different methods of capturing insects used allowed us to harvest. A significant number of arthropod species has been identified, ie a total of 619 insects. Twenty-six species are distributed among 5 systematic orders, the most important of which are Coleoptera, Hymenoptera, Diptera, Heteroptera and Lepidoptera, distributed among 15 families.

Numbers of the order of 156 and 145 individuals were collected respectively at the station (A) and Station (B), the data collected show a considerable numerical importance in favor of the Coleoptera, or in this case the blank worms *Geotrogus deserticol* species very harmful to different varieties of cereals with also the importance of a very predatory helpful *Coccinella septempunctata*. However, the Diptera order remains very marked by the Syrphidae family, the latter deserves special attention given the lack of information on this group of insects which is very useful in ecology. On the other hand, for the rest of the other orders, in particular the Heteroptera, Hymenoptera and Lepidoptera, the traps have not could identify enough information, given the time course of our experimentation, only a few species could be identified and the trophic status was not assessed in this work.


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