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# Contribution to the study of entomofauna of the saline wetland of chott of Beida in Algeria

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#### Abstract

The present study aims at assessing entomofauna biodiversity in the Saline wetlands (Chott) located in the northeast of Algeria in the Setif region. To determine the environmental factors their predominant the distribution of insecta, an inventory was carried out to study the insect diversity and distribution in two stations were selected of Chott of Beida, during November 2014 to September 2015. The selected stations in the study area were divided to six transects according to distribution of plant and according to the soil salinity in each of stations. A total of 4213 insects belonging to 07 orders, 34 families, 57 species were collected from the Chott Beida. The Highest abundance of Coleoptera (49,12%) while lowest abundance of Collembola (05,26%). Highest number of (2520 individuals) found in station 2, while lowest number (1693 individuals) in station2. The Highest abundance of insects (50) were recorded in transect I station 1 and lowest abundance of species were recorded in transect III station 1. Diversity and Equitability indices showed highest values in station 1 (H =2,877; E= 0,7282), Similarly, while highest value at station 2 transect I (H =3,912; M= 12,53). Similarity Jaccard index (J) showed highest similarity was between station1 transect I and station 2 transect I (78,846%).

Keywords: Entomofauna, vegetation, Saline wetlands, soil salinity, Ecological Indices, Chott of Beida.

#### 1. Introduction

Algeria by its unique geographical position, and its varied terrain, and climate. In addition to the various types of natural freshwater wetlands and saline wetlands (Chott and Sabkhas), also contribute to the floral and faunal diversity. Currently 42 out of the 300 lakes in Algeria are listed under the Ramsar Convention covering an area of 3 million ha [1]. The most characteristic type of the Algerian wetlands is endorheic lakes type (seasonal/intermittent) that consists of Sabkha and Chott "saline lakes", The Chotts and Sebkhas are typically seasonal lake which dry out in summer and re-flood in winter <sup>[1]</sup>. According to <sup>[2]</sup> Sabkha is the central zone of saline lake dominated by water and devoid of vegetation due to high salt concentrations. The chott is the surrounding zone which forms a vegetation ring around the water. The biodiversity values of the saline wetlands in the Chott Beida have been recognised as being of national and international significance, as demonstrated through their listing by the Ramsar Convention on Wetlands. Due to the outstanding diversity of their plant communities, and their role in conserving the large numbers of animals and migration of water birds that congregate during the dry season and also rare insect species. Insects are the earth's most diverse organisms, accounting for about half of the described species of living things and about three-quarters of all known animals. According to <sup>[3]</sup> most of the insects are terrestrial; their diversity also includes many species that are aquatic in habit. It can live in almost all ecosystems; swamps, jungles, deserts, due to their highest chance of survival and ability to adapt to changing conditions [4].

Our main goal was to study diversity of insects (species composition, abundance, density of insects) and vegetation cover of some saline wetlands (Chott and Sebkha) in the northeastern Algeria to determine the relationship between insects community structure and environmental factors (some soil factors and plants).

# 2. Materials and Methods

# 2.1 Description of the study area

Chott of Beida is located between( longitudes  $5^{\circ} 53' 20'' \text{ E} - 5^{\circ} 53' 30'' \text{ E}$  and latitudes  $35^{\circ} 57' 80'' \text{ N} - 35^{\circ} 54' 20'' \text{ N}$ ) which is located at 20 km southeast of Setif city in northeastern Algeria, the total site area covers 12.223 ha and has an average altitude of 874 to 887 m

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(Fig. 1)<sup>[5]</sup> is a temporary natural salt lake which is called Sebkha, this Sebkha is a part of Chott of Beida region which is a saline wetland classified in the Ramsar Convention. In terms of the floristic and animal biodiversity, the saline wetland of Chott of Beida is characterized by steppic and halophyte species such as Artemisia herba alba, Bromus madritensis, Hordeum murinum, Lygeum spartum, Juncus maritimus, Peganum harmala, Atriplex halimus, Salsola vermiculata, Suaeda fruticosa, Lygeum spartum <sup>[1, 5]</sup>.





Fig 1: Locations of stations and transects in Chott of Beida of saline wetland in Setif region.

#### 2.2 Sample collection

Insects were collected monthly in the period from November 2014 to September 2015, within halophytic plant belts surrounding directed from the periphery to centre. A total of six Transects representing two stations, with three transects for each station, within an area of 15m<sup>2</sup>. Insects were collected at 9.00 am to 12.00 am local time in 2 week of every month, insects were collected by a insects nets, pitfall trap, hand collection, and sweeping net. The vegetation around each Sabkha or Chott was sampled along 3 transects. After collection were putting in plastic bag and preserved in 70% alcohol, date and time of sampling and place of collection were recorded on each specimens. The insects were indentified using binocular microscope and Identification was done on the basis of morphological characteristic of various body parts: pattern abdomen, wing venation features, wing venation, the genitalia, antennae length, coloration, and, number of stripes etc.

#### 2.3 Statistical analysis

Data were analyzed with the statistical software of Microsoft excel 2010 to count Ecological indices. Another statistic

programme was used, Past. Where the results analyses the presence or absence of insects in the stations of the study and comparing how match at transects. In addition, the aim is to know the Specific species richness, Relative abundance, and these making different biological and Ecological indices. Analyses

The number of specie (specie richness or specie S) was measured by counting the number of insects found in the transects, to determine their diversity. Three indices were used to obtain estimation of species diversity, species richness and species evenness. Diversity index values were obtained by using the following equations:

# 2.3.1 Shannon-Weiner Index

Shannon Weaver diversity index (H) was calculated according to the expression of Shannon-Weaver, (1949):

- $H = -\Sigma Pi \ln Pi$ Where:
- H = Shannon Wiener index of diversity.
- Pi = S / N
- S = number of species
- N = Total number of individuals of all species.

In = logarithm to base e

#### 2.3.2 Evenness index

Evenness index (E) was calculated following the equation of Pielou (1966):  $E = H / \ln S$ 

#### 2.3.3 Richness index

Richness index (D) was calculated by the equation of Margalef (1968):  $D = S-1 / \ln N$ 

#### 2.3.4 Jaccard's similarity index

Jaccard's similarity index J was calculated according to Jaccard (1908):

 $J = (a/a + b + c) \times 100$ Where:

a = number of species of Insects present at transects I and II. b = number of species of Insects present at transects II and not present at transects I.

c = number of species of Insects present at transects I and not found at transects II.

## 3. Results

### **3.1 Species Composition**

Total of 4213 individuals belonging to 9 orders, 34 families, 51 genera and 57 species were collected from the Chott of Beida. These insects belonging to seven orders: Collembola (2 families), Coleoptera (11 families), Diptera (7 families), Hemiptera (4 families), Hymenoptera (5 families), Lepidoptera (2 families) and Orthoptera (3 families) were collected from November 2014 to September 2015 from two stations of the Chott Beida or sebkha (Fig. 2). Overall species diversity and abundance revealed that insects of the Coleoptera order were most abundant (11 families constituted 32.35% of the total families, 28 species constituted 49,12% of the total species) and Collembola (2 families 5.88%, 2 species 4%) least abundant. Among the 34 families of insects, Carabidae and Chrysomelidae represented maximum species (5 species, 09%), followed by the families Cetoniidae, Scarabaeidae and Tenebrionidae both shared 03 species (05%) while the remaining families shared between 01-02 species (Fig. 3 and Fig. 4) and (Table 1).

In terms of the number of individuals, the highest numbers of species were recorded in St2 (2520 individuals), while the lowest numbers of species were recorded in St1 (1693 individuals). During the present study the insects from six different transects were compared, The High number of species were recorded in St2TrI (50 species) while the lowest number of species were recorded in St1TrIII (3 species) (Table 1).

#### 3.2 Abundance

A total of 4213 individuals of insects belonging to 57 species were recorded from different study transects during the study period. St1 supported 55 species with 2520 individuals followed by St1 with 52 species and 1693 individuals. Table 1 presents the relative abundance of different species of insects recorded in different study stations during the present study. *Messor barbarus* (Family: Formicidae) was the most abundant species and constituted 08.85% of the total insects. *Aphaenogaster sp.* (Family: Formicidae) constituted 06,84% of the total insects and was the second most abundant species. Maximum number of individuals of this species was recorded from St2 followed by St1, respectively. On the other hand, *Lixus algirus, Halictus sp and Pamphagidae sp* were the less abundant species in the study area (Table 1).

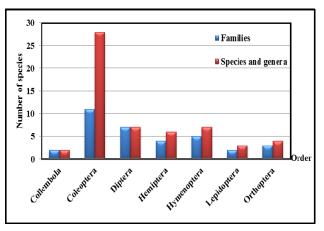


Fig 2: The total number of species and genera and families according to the Order insects.

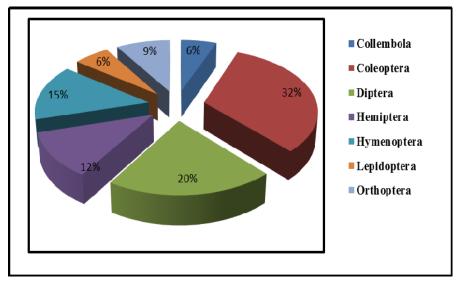


Fig 3: Percentage composition of order of insects in Chott of Beida.

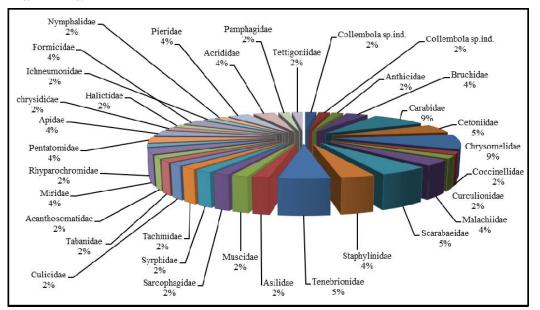


Fig 4: The Relative abundance (%) of insects family were recorded in Chott of Beida.

Stations         St1         St2           Transects         St1Tr[St1Tr]S				Sites	Sites Chott El Beïdha Hammam Essoukhna			
Order         Families         Species and genera         Code         S           Collembola sp.ind.         Collembola sp.ind.         ColCoSp1         Collembola sp.ind.         COCOsp2         Collembola sp.ind.         COCOsp2         Collembola sp.ind.         Collembola sp.ind.         COCOsp2         COANsp         Collembola sp.ind.         COANsp         Coanscience         Coansciencien andual coanscienconscience         Coansc					Stations St1		1	
Order         Families         Species and genera         Code         S           Collembola sp.ind.         Collembola sp.ind.         COCOsp1 <td< th=""><th></th><th></th><th></th><th>Transects</th><th>St1TrISt1TrIISt1TrII</th><th>St2TrISt2TrIISt2TrII</th><th>[</th><th></th></td<>				Transects	St1TrISt1TrIISt1TrII	St2TrISt2TrIISt2TrII	[	
Collembola         Collembola sp.ind.         COCOsp1           Collembola sp.ind.         COCOsp2         Anthicidae           Anthicidae         Anthicidae         Anthicidae         CORNsp           Bruchidae         Bruchus Intericornis (Illiger, 1794).         COBRP1         CORNsp           Bruchidae         Bruchidae         Bruchidae         Bruchidae         Bruchidae           Bruchidae         Bruchidae         Bruchidae         COCABsp1           Bruchidae         Bruchidae         Bruchidae         COCABsp1           Carabidae         Brobidion sp1 ind.         COCABsp1         COCALU           Rembidion sp1 ind.         COCALU         COCECsp1         I           Cetoniidae         Cetonia sp2 ind.         COCECsp2         I           Coleoptera         Chrysomelidae         Chaetocnema aridua (Gyllenha], 1827).         CORHAR         I           Labidastomis taxicomis (Fabricus, 1780).         COCIATA         I         I         Labidastomis taxicomis (Fabricus, 1780).         COCIATA           Coleoptera         Chrysomelidae         Cocanell septempunctata algerica (Kovar, 1977).         COCATA         I           Langitarsus abynthif (Kustera, 1860).         COLO SP2         Cocanellidae         Cocanell septempunctana algerica (Kovar, 1977).	Order	Families	Species and genera				St1	St2
Collembola sp.nd.         COCCosp2           Anthicidae         Anthicidae         Anthicidae         Bruchus luteicornis (Illiger, 1794).         COBRLU           Bruchidae         Bruchus pisorum (Linnaeus, 1758).         COBRPI         Image: Coccentral sp. 100.         Image: Cocccentral sp. 100.         Image: Coccocentral sp. 100. <td></td> <td>Collembola sp.ind.</td> <td></td> <td>COCOsp1</td> <td></td> <td></td> <td>15</td> <td>29</td>		Collembola sp.ind.		COCOsp1			15	29
Anthicidae         Anthicus spind.         COANsp           Bruchudae         Bruchus luteicornis (Illiger, 1794).         COBRU           Bruchus pisorum (Linnaeus, 1758).         COBRPI           Bembidion sp1 ind.         COCABsp1           Carabidae         Bembidion sp1 ind.         COCABT           Bembidion tetracolum, 1781).         COCABT           Carabidae         Broscus sp.ind.         COCABT           Calomera (Rambur, 1837).         CONEAN         COCAST           Cetonia sp1 ind.         COCECSp2         I           Cetonia sp1.ind.         COCECSp2         I           Chrysomelidae         Cheara aridula (Gyllenhal, 1827).         CORHAN           Colecoptera         Chrysomelidae         Labidotomis taxicrois (Fabricius 1792).         COLATA           Chrysomelidae         Coccinella septempunctata algerica (Kovar, 1977).         COCOSP         I           Coccinellidae         Coccinella septempunctata algerica (Kovar, 1977).         COCOCULA         I           Malachidae         Cordylepherus viridis (Fabricius, 1787).         COMACV         I           Malachidae         Cordylepherus viridis (Fabricius, 1787).         COSCIF         I           Scarabaeidae         Blabas bison(Linnaeus, 1767).         COSCIF         I <td>Collembola</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>12</td> <td>23</td>	Collembola						12	23
Bruchidae         Bruchus pisorum (Linnaeus, 1758).         COBRPI           Bembidion spl.ind.         COCABSpl           Carabidae         Bembidion spl.ind.         COCABT           Carabidae         Bembidion tetracolum(Linnaeus, 1761).         COCABT           Calomera lunulata (Fabricus, 1781).         COCABT         COCABT           Calomera lunulata (Fabricus, 1781).         COCALU         Nebria andalusia (Rambur, 1837).         CONEAN           Cetonia spl.ind.         COCECSpl         I         I           Cetonia spl.ind.         COCECSpl         I           Christoma aridula (Syllenhal, 1827).         COCHAR         I           Labidostomis tracionis (Pabricus 1792).         COLATA         I           Longitarsus pallecidus (Foudras, 1860).         COLOS SPl         I           Coccinellidae         Coccinellidas (Foudras, 1860).         COCOLS SPl         I           Malachiidae         Malachiida (Fabricus, 1801).         COCULA         I         I           Malachiidae         Gordylepherus viridi (Fabricus, 177).         COSCIF         I         I           Searabaeidae         Blayas spi.nd.         COSCIF         I         I           Blayas spi.nd.         COSCIF         I         I         I         I		Anthicidae	Anthicus sp.ind.				3	0
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Bernbidion tetracolum(Linnacus, 1761).         COCABT           Carabidae         Broxcus sp.ind.         COCABTsp           Calomera lumulata (Fabricius, 1781).         COCALU         Image: Comparison of the sp.ind.           Cetonii aglinad.         COCESpl         Image: Comparison of the sp.ind.         Image: Comparison of the sp.ind.           Cetonii aglinad.         CoCECspl         Image: Comparison of the sp.ind.         COCERspl         Image: Comparison of the sp.ind.           Coleoptera         Chrysomelidae         Chachena aridula (Gyllenhal, 1827).         COCHAR         Image: CoCHAR         Image: Comparison of the sp.ind.         Image: CoCHAR         Image: CoHAR         Imag				COCABsp1			13	39
Carabidae         Broscus sp.ind.         COCABrsp           Calomera lumulata (Fabricius, 1781).         COCALU         1           Nebria andalusia (Rambur, 1837).         CONEAN         1           Cetoniidae         Cetonia sp2.ind.         COCECsp1         1           Cetoniidae         Cetonia sp2.ind.         COCECsp2         1           Chraetocnema aridula (Gyllenhal, 1827).         COCHAR         1           Labidostonis taxicomis (Pabricus 1792).         COLATA         1           Colcoptera         Caccinellidae         Canegitarsus absynthii (Kutschera, 1820).         COLO SP1           Coccinellidae         Labidostonis taxicorenis (Foudras, 1860).         COCU SP2         1           Coccinellidae         Coccinellidae (Foudras, 1860).         COCULA         1           Malachiidae         Malachius bipustidutus (Linnaeus, 1775).         COSCIF         1           Malachiidae         Bubas bison(Linnaeus, 1763).         COSCIF         1           Scarabaeidae         Bubas bison(Linnaeus, 1763).         COSCIF         1           Beldus tricorins (Herbst, 1784).         COSTBT         1         1           Ocypus olens (Müller, 1764).         COOCOL         1         1           Belaps pinind         COBL SP         1 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>7</td> <td>28</td>							7	28
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Coleoptera         Nebria andalusia (Rambur, 1837).         CONEAN         2           Cetonii app 1 ind.         COCECsp1         2           Cetonii app 1 ind.         COCECsp2         2           Coleoptera         Tropinota hirta (Poda, 1761).         COTRHI         2           Chrysomelidae         Chraetocnema aridula (Gyllenhal, 1827).         COCHAR         1           Labidostomis taxicornis (Fabricius 1792)         COLATA         1           Coleoptera         Chrysomelidae         Lachnaia pubescens (Dufor, 1820).         COLOSP1           Longitarsus absynthii (Kutschera, 1862).         COLO SP1         1           Malachiidae         Corcinella septempunctata algerica (Kovar, 1977).         COCOSP         1           Malachiidae         Cordylepherus viridis (Fabricius, 1787).         COMACM         1           Malachiidae         Achtiessa floralis (Fabricius, 1787).         COSCIB         1           Scarabaeidae         Bubas bison(Linnaeus, 1767).         COSCIB         1           Staphylinidae         Degius primeti (Klug, 1830).         COCOCL         1           Bledius tricormis (Herbst, 1784).         COSTB         1         1           Staphylinidae         Pimelia interstitialis (Solier, 1836).         COPIIR         1							0	9
Cetoniidae         Cetonia sp1.ind.         COCECsp1         Image: Control of the sp2.ind.         COCECsp2         Image: Control of the sp2.ind.         Image: Control of the sp2.ind.         COCECsp2         Image: Control of the sp2.ind.         Image: Control of the sp2							4	7
Cetoniidae         Cetoniia sp2.ind.         COCECsp2           Tropinota hirta (Poda, 1761).         COTRHI         1           Coleoptera         Chrysomelidae         Cachania pubescens (Dufour, 1820).         COLARA         1           Chrysomelidae         Lachidostomis taxicornis (Fabricius 1792)         COLATA         1         1           Coleoptera         Chrysomelidae         Lachnaia pubescens (Dufour, 1820).         COLO SP1         1           Coccinellidae         Coccinella septempunctata algerica (Kovar, 1977).         COCOSP         1         1           Coccinellidae         Coccinella septempunctata algerica (Kovar, 1977).         COCUAPU         1         1           Malachiidae         Lixus algirus(Fabricius, 1787).         COMACV         1         1           Malachiidae         Bubas bison(Linnaeus, 1758).         COSCIB         1         1           Scarabaeidae         Bubas bison(Linnaeus, 1763).         COSCIF         1         1           Tropinota squalida (Scopoli, 1763).         COSCIB         1         1         1           Tenebrionidae         Pimelia interstritalis (Solier, 1836).         COPIIN         1         1           Blaps sp.ind.         DIASAsp         1         1         1         1         1 </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>29</td> <td>34</td>							29	34
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Labidostomis taxicornis (Fabricius 1792)         COLATA         1           Coleoptera         Labidostomis taxicornis (Fabricius 1792)         COLATA         7           Coleoptera         Labidostomis taxicornis (Fabricius 1782)         COLAPU         7           Longitarsus absynthii (Kutschera, 1862)         COLO SP1         7           Coccinellidae         Coccinella septempunctata algerica (Kovar, 1977).         COCOSP         1           Curculionidae         Lixus algirus (Fabricius, 1861).         COCULA         1           Malachiidae         Cordylepherus viridis (Fabricius, 1787).         COMACV         1         1           Malachiidae         Aethiessa floralis (Fabricius, 1787).         COSCIF         1         1           Scarabaeidae         Bubas bison(Linnaeus, 1758).         COMACV         1         1           Tropinota squalida (Scopoli, 1763).         COSCIF         1         1           Staphylinidae         Ocypus olens (Müller, 1764).         COSCIF         1         1           Tenebrionidae         Pimelia grandis (Klug, 1830).         COPIN         1         1           Muscidae         Assilidae         Asilidae         Asilidae         1         1         1           Muscidae         Sarcophagidae         Sarco							23	34
Coleoptera         Chrysomelidae         Lachnaia pubescens (Dufour, 1820).         COLAPU         Image: Color (Color)         COLORPI           Longitarsus absynthii (Kutschera, 1862).         COLO SP1         Image: Color (Color)         Image: Color)         Image: Color (Color)         Image: Color)         Ima							113	-
Coleoptera       Longitarsus absynthii (Kutschera, 1862).       COLO SP1         Longitarsus pellucidus (Foudras, 1860).       COLO SP2         Coccinellidae       Coccinella septempunctata algerica (Kovar, 1977).       COCOSP         Curculionidae       Lixus alginus(Fabricius, 1801).       COCULA         Malachiidae       Cordylepherus viridis (Fabricius, 1787).       COMACV       11         Malachiidae       Malachius bipustulatus (Linnaeus, 1758).       COMAMB       0         Scarabaeidae       Bubas bison(Linnaeus, 1767).       COSCIF       0         Staphylinidae       Bledius tricornis (Herbst, 1784).       COSCTS       0         Tenebrionidae       Pimelia interstitialis (Solier, 1836).       COPIIN       0         Muscidae       Asilidae       Asiliussp.ind.       DIASAsp       0         Muscidae       Musca domestica (Linnaeus, 1758).       DIMUMD       1         Sarcophagidae       Sarcophaga carnaria (Linnaeus, 1758).       DIMUMD       1         Sarcophagidae       Sarcophaga carnaria (Linnaeus, 1758).       DISASA       1         Muscidae       Culex piptus sp.ind.       DISASA       1         Asilidae       Culex piptus sp.ind.       DISASA       1         Acanthosomatidae       Acanthosomatidae sp.ind.		Chrysomelidae					78	93
Longitarsus pellucidus (Foudras, 1860).       COLO SP2         Coccinellidae       Coccinella septempunctata algerica (Kovar, 1977).       COCOSP         Curculionidae       Lixus algirus (Fabricius, 1801).       COCULA         Malachiidae       Cordylepherus viridis (Fabricius, 1787).       COMACV       1         Malachiidae       Malachius bipustulatus (Linnaeus, 1758).       COMACV       1         Scarabaeidae       Bubas bison(Linnaeus, 1787).       COSCBB       1         Staphylinidae       Bledius tricornis (Herbst, 1784).       COSCTF       1         Staphylinidae       Ocypus olens (Müller, 1764).       COOCOL       1         Tenebrionidae       Pimelia interstitialis (Solier, 1836).       COPIIN       1         Muscidae       Musca domestica (Linnaeus, 1758).       DIMUMD       1         Sarcophagidae       Sarcophaga carnaria (Linnaeus, 1758).       DISASA       1         Guiciciae       Culex pipiens (Linnaeus, 1758).       DIMUMD       1         Tabanidae <t< td=""><td>Coleoptera</td><td></td><td></td><td></td><td></td><td>11</td><td>23</td></t<>	Coleoptera						11	23
CoccinellidaeCoccinella septempunctata algerica (Kovar, 1977).COCOSPCurculionidaeLixus algirus(Fabricius, 1801).COCULAMalachiidaeCordylepherus viridis (Fabricius, 1787).COMACVMalachiidaeAethiessa floralis (Fabricius, 1787).COMAMBScarabaeidaeBubas bison(Linnaeus, 1758).COMAMBScarabaeidaeBubas bison(Linnaeus, 1767).COSCIFTropinota squalida (Scopoli, 1763).COSCTSStaphylinidaeBledius tricornis (Herbst, 1784).COSTBTOcypus olens (Müller, 1764).COOCOLTenebrionidaePimelia interstitialis (Solier, 1836).COPIINTenebrionidaePimelia interstitialis (Solier, 1836).COPIGRMuscidaeMusca domestica (Linnaeus, 1758).DIMUMDSarcophagidaeSarcophaga carnaria (Linnaeus, 1758).DIMUMDSarcophagidaeSarcophaga carnaria (Linnaeus, 1758).DISYSspTachinidaeTlephusa sp.ind.DISYSspCulicidaeCulex pipiens (Linnaeus, 1758).DICUCPTabanidaeTabanidae sp.ind.DITATaspMiridaeCanthosomatidae sp.ind.HEMICspMiridaeCanthosomatidae sp.ind.HEMICspMiridaeCanthosomatidae sp.ind.HEMICspMiridaeCanthosomatidae sp.ind.HEMICspMiridaeCanthosomatidae sp.ind.HEMICsp							5	14
Curculionidae         Lixus algirus(Fabricius, 1801).         COCULA           Malachiidae         Cordylepherus viridis (Fabricius, 1787).         COMACV         1           Malachiidae         Malachius bipustulatus (Linnaeus, 1788).         COMAMB         0           Scarabaeidae         Bubas bison(Linnaeus, 1787).         COSCIF         0           Scarabaeidae         Bubas bison(Linnaeus, 1767).         COSCBB         0           Staphylinidae         Bledius tricornis (Herbst, 1784).         COSTBT         0           Staphylinidae         Bledius tricornis (Herbst, 1784).         COSTBT         0           Tenebrionidae         Pimelia interstitialis (Solier, 1836).         COPIIN         0         0           Muscidae         Musca domestica (Linnaeus, 1758).         DIMUMD         0         0         0           Sarcophagidae         Sarcophaga carnaria (Linnaeus, 1758).         DISASA         0         0         0           Sarcophagidae         Sarcophaga carnaria (Linnaeus, 1758).         DISASA         0 <t< td=""><td>Coccinellidae</td><td></td><td></td><td></td><td></td><td>89</td><td>67</td></t<>		Coccinellidae					89	67
Malachiidae         Cordylepherus viridis (Fabricius, 1787).         COMACV         1           Malachiidae         Malachius bipustulatus (Linnaeus, 1758).         COMAMB         9           Scarabaeidae         Bubas bison(Linnaeus, 1767).         COSCIF         9           Scarabaeidae         Bubas bison(Linnaeus, 1767).         COSCBB         9           Tropinota squalida (Scopoli, 1763).         COSCTS         9           Staphylinidae         Bledius tricornis (Herbst, 1784).         COSCDE         9           Tenebrionidae         Pimelia interstitialis (Solier, 1836).         COPIIN         9           Tenebrionidae         Pimelia grandis (Klug, 1830).         COPIGR         9           Muscidae         Musca domestica (Linnaeus, 1758).         DIMUMD         1           Diptera         Syrphidae         Sarcophagidae         Sarcophaga carnaria (Linnaeus, 1758).         DISASA         7           Diptera         Syrphidae         Culicidae         Culex pipiens (Linnaeus, 1758).         DISYSsp         1           Acanthosomatidae         Tabanidae sp.ind.         DITATsp         1           Miridae         Causthosomatidae sp.ind.         DITATsp         1							1	5
Malachiidae       Malachius bipustulatus (Linnaeus, 1758).       COMAMB       Image: Comparison of the system of							122	301
Aethiessa floralis (Fabricius, 1787).       COSC1F         Scarabaeidae       Bubas bison(Linnaeus, 1767).       COSCBB         Tropinota squalida (Scopoli, 1763).       COSCTS         Staphylinidae       Bledius tricornis (Herbst, 1784).       COSTBT         Ocypus olens (Müller, 1764).       COOCOL       Image: Control of the state interstitialis (Solier, 1836).         Tenebrionidae       Pimelia interstitialis (Solier, 1836).       COPIIN         Pimelia interstitialis (Solier, 1836).       COPIGR         Asilidae       Asilussp.ind.       DIASAsp         Muscidae       Musca domestica (Linnaeus, 1758).       DIMUMD         Sarcophagidae       Sarcophaga carnaria (Linnaeus, 1758).       DISASA         Culicidae       Culex pipiens (Linnaeus, 1758).       DICUCP         Tabanidae       Tabanidae sp.ind.       DITATasp         Miridae       Campyloneura sp.ind.       HEMICsp         Miridae       Campyloneura sp.ind.       HEMICsp							91	245
Scarabaeidae         Bubas bison(Linnaeus, 1767).         COSCBB           Tropinota squalida (Scopoli, 1763).         COSCTS           Staphylinidae         Bledius tricornis (Herbst, 1784).         COSTBT           Staphylinidae         Ocypus olens (Müller, 1764).         COOCOL           Tenebrionidae         Bledius tricornis (Herbst, 1784).         COBL SP           Tenebrionidae         Pimelia interstitialis (Solier, 1836).         COPIIN           Pimelia grandis (Klug, 1830).         COPIGR         Image: Cophagidae           Asilidae         Asilussp.ind.         DIASAsp           Muscidae         Musca domestica (Linnaeus, 1758).         DIMUMD           Sarcophagidae         Sarcophaga carnaria (Linnaeus, 1758).         DISASA           Culicidae         Culex pipiens (Linnaeus, 1758).         DICUCP           Tabanidae         Tabanidae sp.ind.         DITATsp           Acanthosomatidae         Acanthosomatidae sp.ind.         HEMICsp           Miridae         Campyloneura sp.ind.         HEMICsp		Scarabaeidae					8	4
Image: Staphylinidae         Tropinota squalida (Scopoli, 1763).         COSCTS           Staphylinidae         Bledius tricornis (Herbst, 1784).         COSTBT           Ocypus olens (Müller, 1764).         COOCOL           Tenebrionidae         Blaps sp.ind.         COBL SP           Tenebrionidae         Pimelia interstitialis (Solier, 1836).         COPIIN           Asilidae         Asilussp.ind.         DIASAsp           Muscidae         Musca domestica (Linnaeus, 1758).         DIMUMD           Sarcophagidae         Sarcophagidae carnaria (Linnaeus, 1758).         DISASA           Tachinidae         Tlephusa sp.ind.         DISYSp         1           Acanthosomatidae         Acanthosomatidae sp.ind.         DITATasp         1           Miridae         Campyloneura sp.ind.         HEMICsp         1							2	2
Staphylinidae       Bledius tricornis (Herbst, 1784).       COSTBT         Staphylinidae       Ocypus olens (Müller, 1764).       COOCOL         Blaps sp.ind.       COBL SP         Tenebrionidae       Pimelia interstitialis (Solier, 1836).       COPIIN         Asilidae       Asilussp.ind.       DIASAsp         Muscidae       Musca domestica (Linnaeus, 1758).       DIMUMD         Sarcophagidae       Sarcophagidae       Sarcophagidae         Syrphidae       Telephusa sp.ind.       DISASA         Culicidae       Culex pipiens (Linnaeus, 1758).       DICUCP         Tachinidae       Telphusa sp.ind.       DITATsp         Acanthosomatidae       Acanthosomatidae sp.ind.       HEMICsp         Miridae       Campyloneura sp.ind.       HEMICsp							11	9
Staphylinidae       Ocypus olens (Müller, 1764).       COOCOL         Blaps sp.ind.       COBL SP         Tenebrionidae       Pimelia interstitialis (Solier, 1836).       COPIIN         Pimelia grandis (Klug, 1830).       COPIGR         Muscidae       Asilidae (Linnaeus, 1758).       DIASAsp         Muscidae       Sarcophagidae       Sarcophaga carnaria (Linnaeus, 1758).       DISASA         Syrphidae       Syrphus sp.ind.       DISYSsp       I         Culicidae       Culex pipiens (Linnaeus, 1758).       DICUCP       1         Tachinidae       Tephusa sp.ind.       DITATsp       1         Acanthosomatidae       Acanthosomatidae sp.ind.       HEMICsp       1         Miridae       Campyloneura sp.ind.       HEMICsp       1		Staphylinidae					7	5
Blaps sp.ind.       COBL SP         Tenebrionidae       Pimelia interstitialis (Solier, 1836).       COPIIN         Pimelia grandis (Klug, 1830).       COPIGR         Asilidae       Asilussp.ind.       DIASAsp         Muscidae       Musca domestica (Linnaeus, 1758).       DIMUMD         Sarcophagidae       Sarcophaga carnaria (Linnaeus, 1758).       DISASA         Diptera       Syrphidae       Syrphus sp.ind.       DISYSsp         Tachinidae       Tlephusa sp.ind.       DITATsp         Culicidae       Culex pipiens (Linnaeus, 1758).       DICUCP         Tabanidae       Tabanidae sp.ind.       DITATasp         Acanthosomatidae       Acanthosomatidae sp.ind.       HEACsp         Miridae       Campyloneura sp.ind.       HEMICsp         Miridae       Lawas sp.ind.       HEMICsp							3	5
Tenebrionidae       Pimelia interstitialis (Solier, 1836).       COPIIN         Pimelia grandis (Klug, 1830).       COPIGR         Asilidae       Asilussp.ind.       DIASAsp         Muscidae       Musca domestica (Linnaeus, 1758).       DIMUMD         Sarcophagidae       Sarcophaga carnaria (Linnaeus, 1758).       DISASA         Diptera       Syrphidae       Syrphus sp.ind.       DISYSsp         Tachinidae       Tlephusa sp.ind.       DITATsp         Culicidae       Culex pipiens (Linnaeus, 1758).       DICUCP         Tabanidae       Tabanidae sp.ind.       DITATasp         Acanthosomatidae       Acanthosomatidae sp.ind.       HEACsp         Miridae       Campyloneura sp.ind.       HEMICsp         Miridae       Lawas sp.ind.       HEMICsp		Tenebrionidae					3	2
Pimelia grandis (Klug, 1830).         COPIGR           Asilidae         Asilussp.ind.         DIASAsp           Muscidae         Musca domestica (Linnaeus, 1758).         DIMUMD           Sarcophagidae         Sarcophaga carnaria (Linnaeus, 1758).         DISASA           Syrphidae         Syrphus sp.ind.         DISYSsp           Tachinidae         Tlephusa sp.ind.         DITATsp           Culicidae         Culex pipiens (Linnaeus, 1758).         DICUCP           Tabanidae         Tabanidae sp.ind.         DITATsp           Acanthosomatidae         Acanthosomatidae sp.ind.         HEACsp           Miridae         Campyloneura sp.ind.         HEMICsp							6	9
Asilidae     Asilussp.ind.     DIASAsp       Muscidae     Musca domestica (Linnaeus, 1758).     DIMUMD     1       Sarcophagidae     Sarcophaga carnaria (Linnaeus, 1758).     DISASA     1       Diptera     Syrphidae     Syrphus sp.ind.     DISYSsp     1       Culicidae     Culex pipiens (Linnaeus, 1758).     DICOP     1       Tachinidae     Tlephusa sp.ind.     DITATsp     1       Culicidae     Culex pipiens (Linnaeus, 1758).     DICOP     1       Tabanidae     Tabanidae sp.ind.     DITATsp     1       Acanthosomatidae     Acanthosomatidae sp.ind.     HEACsp     1       Miridae     Campyloneura sp.ind.     HEMICsp     1							3	7
Muscidae     Musca domestica (Linnaeus, 1758).     DIMUMD     1       Sarcophagidae     Sarcophaga carnaria (Linnaeus, 1758).     DISASA     1       Diptera     Syrphidae     Syrphus sp.ind.     DISYSsp     1       Tachinidae     Tlephusa sp.ind.     DITATsp     1       Culicidae     Culex pipiens (Linnaeus, 1758).     DICUCP     1       Tabanidae     Tabanidae sp.ind.     DITATsp     1       Acanthosomatidae     Acanthosomatidae sp.ind.     HEACsp     1       Miridae     Campyloneura sp.ind.     HEMICsp     1		Asilidae					9	4
Sarcophagidae         Sarcophaga carnaria (Linnaeus, 1758).         DISASA           Diptera         Syrphidae         Syrphus sp.ind.         DISYSsp           Tachinidae         Tlephusa sp.ind.         DITATsp           Culicidae         Culex pipiens (Linnaeus, 1758).         DICUCP           Tabanidae         Tabanidae sp.ind.         DITATasp           Acanthosomatidae         Acanthosomatidae sp.ind.         HEACsp           Miridae         Campyloneura sp.ind.         HEMICsp							134	
Diptera     Syrphidae     Syrphus sp.ind.     DISYSsp       Tachinidae     Tlephusa sp.ind.     DITATsp       Culicidae     Culex pipiens (Linnaeus, 1758).     DICUCP       Tabanidae     Tabanidae sp.ind.     DITATasp       Acanthosomatidae     Acanthosomatidae sp.ind.     HEACsp       Miridae     Campyloneura sp.ind.     HEMICsp	Diptera						77	13
Tachinidae     Tlephusa sp.ind.     DITATsp       Culicidae     Culex pipiens (Linnaeus, 1758).     DICUCP       Tabanidae     Tabanidae sp.ind.     DITATasp       Acanthosomatidae     Acanthosomatidae sp.ind.     HEACsp       Miridae     Campyloneura sp.ind.     HEMICsp							2	6
Culicidae     Culex pipiens (Linnaeus, 1758).     DICUCP       Tabanidae     Tabanidae sp.ind.     DITATasp       Acanthosomatidae     Acanthosomatidae sp.ind.     HEACsp       Miridae     Campyloneura sp.ind.     HEMICsp							5	2
Tabanidae     Tabanidae sp.ind.     DITATasp       Acanthosomatidae     Acanthosomatidae sp.ind.     HEACsp       Miridae     Campyloneura sp.ind.     HEMICsp							133	48
Acanthosomatidae     Acanthosomatidae sp.ind.     HEACsp       Miridae     Campyloneura sp.ind.     HEMICsp							6	4
Miridae Campyloneura sp.ind. HEMICsp							3	5
Miridae I yours sp ind HEMII sp							11	21
			Lygus sp.ind.	HEMILsp			7	10
	Hemiptera	Rhyparochromidae					0	12
Graphosoma italicum (Lippaeus 1758) HEPEGL		- 21					11	12
Pentatomidae 1		Pentatomidae	1				3	8

	Anidaa	Apis sp.ind.	HYAPPM							3	4
	Apidae	Apidae sp.ind.	HYAPAsp							0	7
	chrysididae	chrysididae sp.ind.	HYCHCsp							0	4
Hymenoptera	Halictidae	Halictus sp.ind. HYHAHsp							0	1	
	Formicidae	Aphaenogaster sp.ind.	HYFOAsp							221	376
	Formerdae	Messor barbarus (Linnaeus, 1767). HYFOMB								332	487
	Ichneumonidae	Ichneumonidae sp.ind. HYICIsp				4	7				
	Nymphalidae	Vanessa cardui (Linnaeus, 1758).	LENYVC							4	9
Lepidoptera	Pieridae	Pieris rapae (Linnaeus, 1758).	LEPIPR							6	8
	Fieliuae	Pieris brassicae (Linnaeus, 1758).	LEPIPB							5	4
	Acrididae	Dociostaurus maroccanus(Thunberg, 1815).	ORACDM							2	3
Orthoptera	Actividae	Locusta migratoria(Linné, 1767).	ORACLM							5	2
Orthoptera	Pamphagidae	hagidae Pamphagidae sp.ind.								1	0
	Tettigoniidae	Tettigoniidae sp.ind.	ORTEsp							2	3
7	34	57	57	57	57	57	57	57	57	1693	2520
				43	30	3	50	40	7	42	13

#### **Biological Indices**

During the present study the insects diversity between six of different transect were compared and Shannon-Wiener diversity indexes, Equitability index, Simpson index and Margalef index were calculated as a measure of diversity within the stations and transects.

# Stations level

The highest diversity index (H =2,877) observed at St1, the lowest diversity index was found at St2 (H =2,814), similarly, the St2 showed a low value of Simpson index (D-1 = 0,8998) as compared to St1 (D-1 =0,9113), in the other hand the St2 showed high species richness which is indicated by high value of Margalef index (M = 6,895) compared to St1, the highest value of the index Equitability (E= 0,7282) at St1, while reached the lowest value at St2 (E= 0,7022) (Table 2).

**Table 2:** The different dominance and diversity indices (Shannon-Weiner index, Margalef's diversity index and Evenness index,

Equitability), abundance and number of Insects species in the two study stations.

Index	Station 1	Station 2
Taxa_S	52	55
Individuals	1693	2520
Dominance_D	0,08869	0,1002
Simpson_1-D	0,9113	0,8998
Shannon_H	2,877	2,814
Margalef_ M	6,86	6,895
Equitability_J	0,7282	0,7022

# Stations and transects level

Lowest value of Shannon-Wiener diversity (H =1,099) and Simpson index (D-1 = 0,6667) and Margalef index (M = 1,82) were recorded at St1Tr III, while highest value at St2TrI. (Table3).

Index	St1TrI	St1TrII	St1TrIII	St2TrI	St2TrII	St2TrIII
Dominance_D	0,02326	0,03333	0,3333	0,02	0,025	0,1429
Simpson_1-D	0,9767	0,9667	0,6667	0,98	0,975	0,8571
Shannon_H	3,761	3,401	1,099	3,912	3,689	1,946
Margalef_M	11,17	8,526	1,82	12,53	10,57	3,083

# Similarity Jaccard index

Results showed similarities in the presence of the species between the six transects studied using Jaccard similarity index. However, highest similarity (78,846%) was observed between St1TrI and St2TrI, while lowest similarity (1,921%) was shown between St1TrIII and St2TrI (Table 4).

**Table 4:** The percentages for degree of similarity among species by using similarity Jaccard index according to presence or absence insect's species in the different transects of two stations.

Jaccard index	St1TrI	St1TrII	St1TrIII	St2TrI	St2TrII	St2TrIII
St1TrI	1	0,46	0,022222	0,78846	0,53704	0,086957
St1TrII	0,46	1	0,03125	0,53846	0,55556	0,12121
St1TrIII	0,022222	0,03125	1	0,019231	0,075	0,42857
St2TrI	0,78846	0,53846	0,019231	1	0,63636	0,075472
St2TrII	0,53704	0,55556	0,075	0,63636	1	0,175
St2TrIII	0,086957	0,12121	0,42857	0,075472	0,175	1

Cluster analysis for similarity degree of composition qualitative of insects among different study transects and station showed two different main groups (Fig.5).

The first main group (I) include three of subgroups, the first subgroup formed of St1TrI and St2TrI at the level of

similarity (78,846%) and the second subgroup had only St2Tr II (58%), While the third subgroup included St1TrII only when the level of similarity of 50 %. Whilst the second main group (II), also included St1TrIII and St2TrIII at the level of similarity (43 %) (Fig.5).

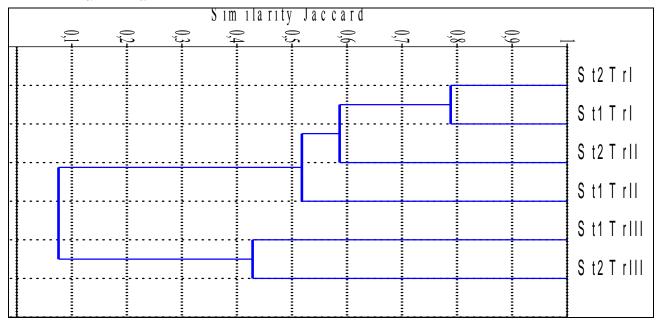


Fig 5: Dendrogram showing the similarity between stations and transects by using Jaccard's Index of Similarity.

## 4. Discussion

#### Species composition

The study was carried in Chott of Beida. The place of study let as to count 57 species of the total number of all species from of insects distributed on 07 orders and 34 families. These results agree with many researchers in saline wetlands among which the study carried <sup>[6]</sup> also study <sup>[7]</sup>.

The present results indicate that there were differences in the species richness and abundance of insects among the two stations and six transects, station 2 and transect I apparently is the richest. This is probably due to the presence of plant species richness and abundance of insects varied across vegetation gradient and soil salinity. Low soil salinity and high plant cover (TrI) supported higher number of species and individuals followed by low number of species and individuals decreased with increasing vegetation is very poor and low soil salinity (TrII) and high soil salinity and vegetation is very rare (TrIII), respectively. It is suggested that the number of species and individuals of insects found at the higher soil salinity and vegetation is very rare is much lower compared to at lower low soil salinity and high plant cover.

The Coleoptera order in the present study was dominated by the families Chrysomelidae and Carabidae which comprises 09 % of the total species, also recorded similar findings. In the present study  $[^{7-9]}$ .

Our results showed that some species of Hymenoptera and Coleoptera, Diptera and Lepidoptera such as Messor barbarus, Aphaenogaster sp, Vanessa cardui, Pieris rapae, Pieris brassicae, Culex pipiens, Coccinella septempunctata algerica and Tropinota hirta were recorded in different transects. According to <sup>[10-14]</sup>. Hymenoptera and Coleoptera and Diptera is reported as ecologically tolerant and has an extensive geographical range and in all types of environments, whereas those species of insects which were rare in abundance at transect III such as *Halictus sp*, chrysididae sp (Hymenoptera), Pamphagidae sp (Orthoptera) and Anthicus sp (Coleoptera). May have narrow range of tolerance to these environmental conditions, especially higher soil salinity and low vegetation <sup>[15, 16]</sup>.

## Diversity indices

The results of biological indices showed different values among stations and transects and species richness. The highest number of species and Margalef index were observed at St2 and St2TrI and St1TrI, compared to St1TrIII (Table 2 and Table 3). While highest values of Simpson, Shannon and equitability were observed at St1 and St2TrI, compared to St1TrIII. diversity and richness recorded at St2TrI (Table 2 and Table 3). Might be due to environmental factors, such as availability of plants, which play a vital role in insects diversity and distribution, indicating the dominance of some insects species like Messor barbarus, Aphaenogaster sp, Cordylepherus viridis, Malachius bipustulatus and Labidostomis taxicornis. While the low species richness recorded in St1 might be due to anthropogenic factors and overgrazing <sup>[17]</sup>. And pollution discharge which in turn affected the distribution of insects. And low insects density recorded at TrIII was apparently due to the effect of high soil salinity or low soil organic matter and the vegetation is very poor and rare or it can be explained also by unfavourable conditions due to predation by water birds.

## Jaccard similarity index

The jaccard similarity index showed that St1TrI and St2TrI were strongly similar (78,846%) (Table 4). This index revealed that there was a minimum similarity between transects and the two stations.

This observation might be due to the low species richness in this station. In the other hand, the insect species identified in the others stations had high similarity. This similarity may go back to the similarity of climatic. Circumstances or to the nature of plant cover and its density, type of soil or to other factors.

The observed dissimilarity in presence of insects species between TrI and TrIII could be due to variability in soil salinity characteristic and vegetation type (Halophytes).

The results of cluster analysis in this study show two major groupings, mainly segregated by stations and transects.

St1TrI and St2TrI clustered together. The increased abundance of insects, species richness and diversity observed

in St1TrI and St2TrI could be due to the presence of vegetation cover<sup>[1]</sup>.

St1TrIII and St2TrIII clustered together based on low abundance and diversity, perhaps due to the vegetation is very poor and high salt content and low soil organic <sup>[15, 16]</sup>.

## 5. Conclusions

This study provides insights into the effects of a range of environmental parameters on insects of Chott of Beida in Algeria. Altogether 57 species of insects, belonging to 34 families, were identified at the two stations and six transects. Our results documented differences in insects diversity and abundance between stations and transects.

Transect I and station 2 was characterized by low salinity and vegetation and relatively high abundance species, richness and species diversity. Stations 1 and transect III high salinity and lower vegetation, with relatively low species diversity. We consider that salinity and vegetation cover may be responsible for this density of insects. According to <sup>[18]</sup> soil community diversity affects plant diversity which, in turn affects insect diversity.

This study offers new information for insects diversity over study in Chott of Beida and provides important knowledge for better understanding of Saline wetlands in the Algeria.

The information gathered from this study will hopefully help for further study by researchers, students and officers (Forest Conservation, Setif) who have given responsibility in conservation of flora and fauna, especially the flora in Chott of Beida of Forest Conservation Hammam Sokhna, Setif.

## 6. References

- Khaznadar M, Vogiatzakis IN, Griffiths GH. Land degradation and vegetation distribution in Chott El Beida wetland, Algeria. Journal of Arid Environments. 2009; 73(3):369-77.
- 2. Pouget M. Les Relations Sol-Végétation dans les Steppes Sud-Algéroises, Edition ORSTOM, Paris, 1980, 555.
- 3. Westfall Jr MJ, Tennessen KJ. Odonata. An introduction to the aquatic insects of North America.1996; 3:164-211.
- Öztemiz S, Doğanlar M. Invasive plant pests (Insecta and Acarina) of Turkey. Munis Entomology & Zoology. 2015; 10(1):144-159.
- MADR-DGF. Ministère de l'Agriculture et du Développement Rural - Direction Générale des Forêts : ATLAS [IV] des zones humides Algériennes d'importance internationale. Ed. Diwan Alger, 2004, 105.
- Si Bachir A. Etude bioécologique de la faune du lac de Boulhilet ou petit Ank Djamel (Oum el Bouaghi). Thèse. Magis. Univ. Sétif, 1991, 134.
- Boukli Hacene S, Hassaine K, Ponel P. Les peuplements des coléoptères du marais salé de l'embouchure de la Tafna (Algérie). Revue d'écologie - la Terre et la Vie. 2011; 66:1-15.
- Maity P, Roy S, Chakraborti U, Biswas O, Ghosh J, Gayen AK *et al.* Insect faunal diversity of Salt Lake City

   an urbanized area adjacent to Kolkata, India. Bioscience Discovery. 2016; 7(2):101-112.
- Matallah R, Abdellaoui-hassaine K, Ponel P, Bouklihacene S. Diversity of Ground Beetles (Coleoptera Carabidae) in the Ramsar wetland: Dayet El Ferd, Tlemcen, Algeria. Biodiversity Journal. 2016; 7(3):301-310.
- 10. Vidal-Abarca MR, Gómez R, Suárez ML. Los ríos de las regiones semiáridas. Revista Ecosistemas.

2004; 13(1):16-28.

- Padhye AD, Dahanukar N, Paingankar M, Deshpande M, Deshpande D. Season and landscape wise distribution of butterflies in Tamhini, northern Western Ghats, India. Zoos' Print Journal. 2006; 21(3):2175-2181.
- Zinchenko TD, Golovatyuk LV. Salinity tolerance of macroinvertebrates in stream waters. Arid ecosystems. 2013; 3(3):113-121.
- 13. Perveen F, Khan A, Sikander. Characteristics of butterfly (Lepidoptera) fauna from Kabal, Swat. Pakistan Journal of Entomology and Zoology Studies. 2014; 2(1):56-69.
- Khyade VB, Jagtap SG. Diversity of butterflies (Order: Lepidoptera) in Mayureshwar Wildlife Sanctuary of Baramati Tehsil Dist. Pune (India). International Academic Journal of Innovative Research. 2016; 3(11):40-67.
- 15. Aliat T, Kaabeche M. Caractérisation phytoécologique de la zone humide Chott El Beida (Sétif, Algérie). Bulletin de l'Institut Scientifique, Rabat. 2013; 35:35-41.
- Aliat T, Kaabeche M, Khomri H, Nouri L, Neffar S, Chenchouni H. A pedological characterisation of some inland wetlands and Ramsar sites in Algeria. Land degradation & development. 2016; 27(3):693-705.
- 17. Ghosh B, Bhunia D. Scarab beetle (Coleoptera: Scarabaeidae) from Salt Lake City, Kolkata, West Bengal. Journal of Entomology and Zoology Studies. 2016; 4(1):269-73.
- Bennett A. The role of soil community biodiversity in insect biodiversity. Insect Conservation and Diversity. 2010; 3(3):157-171.