

E-ISSN: 2708-0021
 P-ISSN: 2708-0013
www.actajournal.com
 AEZ 2022; 3(2): 44-52
 Received: 20-05-2022
 Accepted: 24-06-2022

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Acta

Entomology and Zoology

Identification and description of species of the genus *Thrips* associated with weed species occurring in the region of Zaghouan (North-Eastern Tunisia)

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DOI: <https://doi.org/10.33545/27080013.2022.v3.i2a.76>

Abstract

This study aims to identify thrips species belonging to the genus *Thrips* occurring on weed species which harbor thrips when crops are absent. An inventory of thrips species was carried out during three consecutive years (2019, 2020 and 2021) in eleven locations in the governorate of Zaghouan (North-Eastern Tunisia). Seven thrips species belonging to the genus *Thrips* were identified: *Thrips tabaci* Lindemann (1888), *T. angusticeps* Uzel (1895), *T. fuscipennis* Haliday (1836), *T. australis* Bagnall (1915), *T. meridionalis* Priesner (1926), *T. palmi* Karny (1925) and *T. imaginis* Bagnall (1926). The most abundant and dominant thrips species was *T. tabaci* considered as eudominant species with 81.7%, followed by *T. angusticeps* and *T. fuscipennis*. The rest of identified species were classified as precedent. Regarding weeds, 31 species were identified (84% dicotyledonous and 16% monocotyledonous) belonging to 16 botanical families. The most represented families were Asteraceae (22%) followed by Poaceae (16%) and Fabaceae (13%). Among these 31 weeds, only 26 species were confirmed as hosts for thrips. Systematic and morphological description of thrips species are given in this paper.

Keywords: *Thrips*, species, weeds, dominant, botanical families.

Introduction

Thrips are small insects that belong to the Order Thysanoptera with fringed wings. Most described species are 1 to 2 mm in length^[5, 36]. They represent an old group of insects whose occurrence dates to several million years ago^[21]. The oldest thrips species that had been described was found by paleontologists in Lebanon and dates to 140 million years ago^[45]. These insects were described and reported for the first time in 1744 by De Geer who gave the name *Physaphus* to these species. In 1758, Linnaeus placed the four known species during that era in the genus *Thrips*^[19] which belongs to the Family Thripidae Stephens (1829) known as the most important thrips family in the Order Thysanoptera with more than 1700 species distributed in 260 genera^[29, 30]. Species of Thripidae family had antenna of 7 to 9 segments with simple or forked sensorial cones on the 3rd and 4th article. The maxillary palps have 3 to 4 segments. Wings are clear with 2 to 3 longitudinal veins on the forewing only, while the hindwing has none. The abdomen has a posterior margin with a complete comb or sometimes absent^[1]. Thripidae family's species are pests attacking several botanical species and cause direct and indirect damages by sucking plants' sap and transmitting viruses^[26]. Thripinae subfamily's species are characterized by long seta especially at the posterior angles of the pronotum, and sometimes at the anterior angles. The tribe Thripina includes around 100 genera, of which the most important are *Frankliniella* Karny (1910) and *Thrips* Linnaeus (1758)^[5]. The genus *Thrips* is considered as the richest one in the Order of Thysanoptera^[30]. Species of this genus have only two pairs of ocellar setae, 7 to 8 antennal articles, 3rd and 4th with forked sensorial cones, pronotum with two pairs of posteroangular setae, tarsi with two segments, two pairs of lateral ctenidia and those of the 8th abdominal segment are posterolateral in relation with the spiracles and the abdominal sternites and pleurotergites are with or without discal setae depending to species^[29]. In general, *Thrips* species can take refuge in weed species as reservoir plants when environmental conditions are unfavorable and in the absence of primary host^[40].

This study aims to identify thrips species belonging to the genus *Thrips* associated to weed species considered as important host plants and represent a reservoir host of many thrips' species.

Material and Methods

Study Sites: The different investigated sites are located in the governorate of Zaghouna in North-eastern Tunisia. Eleven experimental sites were visited during the three

years of the study. These locations are Sminja (S), Boucha (B), Bir Mcherga (BM), Bir Halima (BH), Mograne (M), Fahs (F), Nadhour (N), Saouaf (S), Hammam Zriba (HZ), Djebel Ouest (DO) and Jradou (J), (Figure 1), (Table 1).

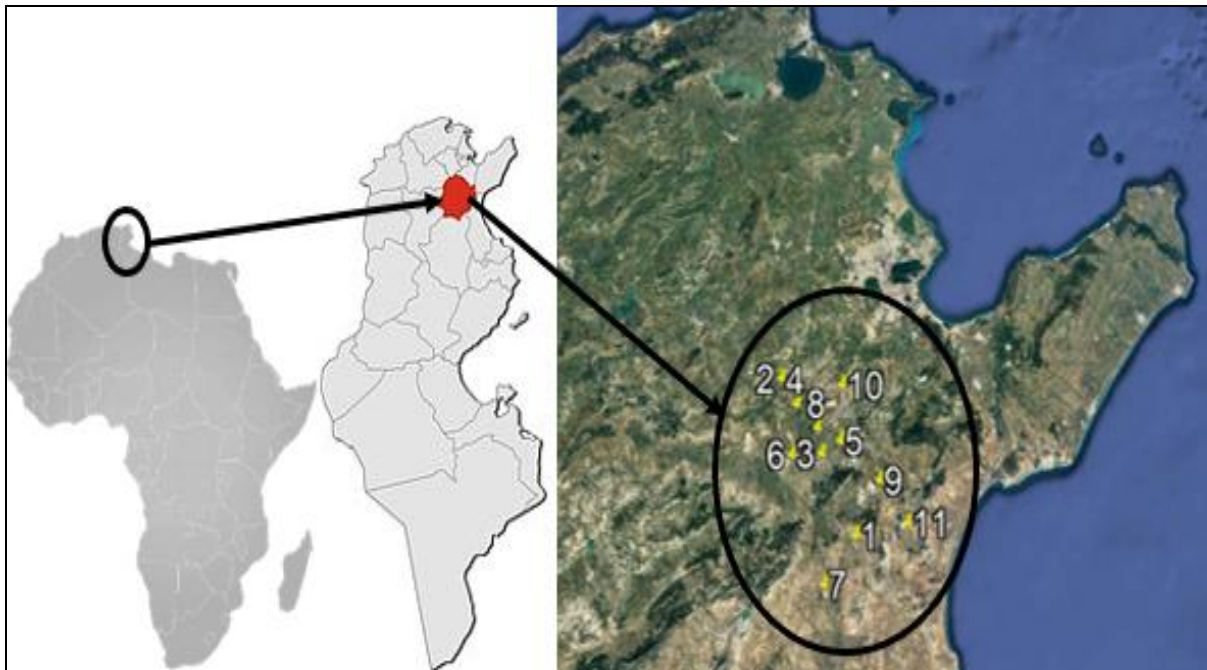


Fig 1: Localization of the experimental sites in the governorate of Zaghouna in Tunisia (Legend: 1: Sminja, 2: Boucha, 3: Bir Mcherga, 4: Bir Halima, 5: Mograne, 6: Fahs, 7: Nadhour, 8: Saouaf, 9: Hammam Zriba, 10: Djebel Ouest, 11: Jradou).

Table 1: Geographical localization of different investigated sites.

Location	Abbreviation	Number	Geographic localization
Sminja	S	1	36°26'48.33''N10°00'56.56''E
Boucha	B	2	36°32'15.35''N09°53'27.36''E
Bir Mcherga	BM	3	36°29'23.32''N09°56'41.22''E
Bir Halima	BH	4	36°23'37.75''N10°02'12.47''E
Mograne	M	5	36°25'32.10''N10°05'24.33''E
Fahs	F	6	36°22'58.49''N09°05'46.87''E
Nadhour	N	7	36°07'19.49''N10°04'57.08''E
Saouaf	S	8	36°14'03.08''N10°09'54.10''E
Hammam Zriba	HZ	9	36°21'18.25''N10°13'22.80''E
Djebel Ouest	DO	10	36°32'30.64''N10°04'44.35''E
Jradou	J	11	36°16'27.37''N10°19'16.55''E

Sampling

This study was carried out from February to July during three years (2019, 2020 and 2021). Sampling was carried out by similar method in all investigated stations in the governorate of Zaghouna. All encountered weed species samples were collected, placed in plastic bags, and then taken back to the Laboratory of Entomology in the Higher School of Agronomy of Mograne (Zaghouna) for further identification. Thrips species were collected from each weed species specimens by beating and then placed in vials containing alcohol 70% for further identification.

Weed species identification

Weed species collected from different investigated sites were identified based on the Tunisia floras documents [13, 18, 37, 38] and available catalog [6]. Names of the families of Angiosperms follow APG III [14].

Thrips species identification

Collected thrips specimens were identified according to Mound and Walker [29], Lacasa and Llorens [17] and Mound and Kibby [30]. Thrips were mounted according to Bournier [5].

Dominance classification

Thrips species encountered on weed host-plants were classified according to their dominance into: subdominants (> 10%), dominants (5.1 to 10%), subdominants (2.1 to 5%), precedents (1 to 2%) and, subprecedents (< 1%) [8, 15].

Results

Weeds identification

A total number of 31 weed species (84 % dicotyledonous and 16% monocotyledonous) were identified in the investigated locations in the governorate of Zaghouna (Table 2) (Figure 2). These species belong to 16 botanical families. The most represented families were Asteraceae (22%) followed by Poaceae (16%) and Fabaceae (13%).

Table 2: Identified sampled weed species in different investigated locations in the governorate of Zaghouna in Tunisia.

Class	Family	Species	Figures
Monocotyledonous	Poaceae	<i>Phalaris canariensis</i> L. (1753)	Figure 2. A
		<i>Cynodon dactylon</i> (L.) Pers. (1805)	Figure 2. B
		<i>Avena sterilis</i> L. (1762)	Figure 2. C
		<i>Bromus rigidus</i> Roth (1790)	Figure 2. D
		<i>Setaria verticillata</i> Beauv.(1812)	-

Dicotyledonous	Amarantaceae	<i>Amaranthus albus</i> L. (1753)	Figure 2. E
	Asteraceae	<i>Anacyclus clavatus</i> (Desf.) Pers. (1807)	Figure 2. F
		<i>Chrysanthemum coronarium</i> L. (1753)	Figure 2. G
		<i>Calendula arvensis</i> L. (1763)	Figure 2. H
		<i>Calendula officinalis</i> L. (1753)	-
		<i>Artemisia herba-alba</i> Asso. (1779)	-
		<i>Silybum marianum</i> L. (1791)	Figure 2. I
	Brassicaceae	<i>Cynara cardunculus</i> L. (1753)	Figure 2. J
		<i>Sinapis arvensis</i> L. (1753)	Figure 2. K
		<i>Diplotaxis muralis</i> L. (1821)	Figure 2. L
	Chenopodiaceae	<i>Chenopodium album</i> L. (1753)	Figure 2. M
	Cucurbitaceae	<i>Ecballium elaterium</i> (L.) A. Rich. (1824)	-
	Convolvulaceae	<i>Convolvulus arvensis</i> L. (1753)	Figure 2. N
	Oxalidaceae	<i>Oxalis pes-caprae</i> L. (1753)	Figure 2. O
	Fabaceae	<i>Vicia sativa</i> L. (1753)	Figure 2. P
		<i>Lotus edulis</i> L. (1753)	-
		<i>Melilotus indica</i> L. All.	Figure 2. Q
		<i>Medicago sativa</i> L. (1753)	Figure 2. R
	Geraniaceae	<i>Geranium tuberosum</i> L. (1753)	-
	Malvaceae	<i>Malva sylvestris</i> L. (1753)	Figure 2. S
Papaveraceae	<i>Papaver rhoeas</i> L. (1753)	Figure 2. T	
Plantaginaceae	<i>Plantago lagopus</i> L. (1753)	-	
Primulaceae	<i>Anagallis arvensis</i> L. (1753)	Figure 2. U	
	<i>Anagallis monelli</i> L. (1753)	-	
Euphorbiaceae	<i>Euphorbia serrata</i> L. (1753)	Figure 2. V	
Apiaceae	<i>Foeniculum vulgare</i> Mill. (1768)	-	

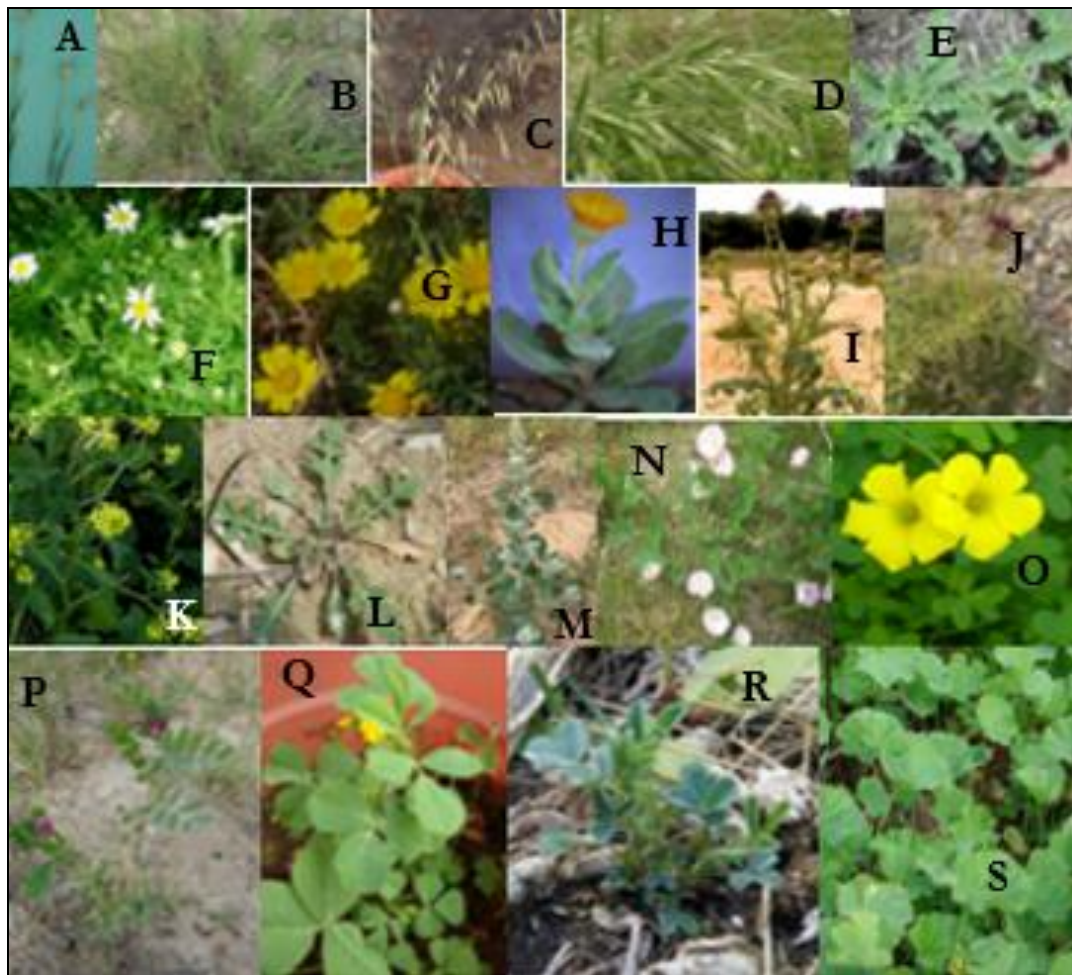




Fig 2: Identified sampled weed species (A. *Phalaris canariensis*, B. *Cynodon dactylon*, C. *Avena sterilis*, D. *Bromus rigidus*, E. *Amaranthus albus*, F. *Anacyclus clavatus*, G. *Chrysanthemum coronarium*, H. *Calendula arvensis*, I. *Silybum marianum*, J. *Cynara cardunculus*, K. *Sinapis arvensis*, L. *Diploaxis muralis*, M. *Chenopodium album*, N. *Convolvulus arvensis*, O. *Oxalis pes-caprae*, P. *Vicia sativa*, Q. *Melilotus indica*, R. *Medicago sativa*, S. *Malva sylvestris*, T. *Papaver rhoeas*, U. *Anagallis arvensis*, V. *Euphorbia serrata*).

Thrips species composition on weeds

This study, and according to the used identification keys, permitted to identify seven different thrips species belonging to the genus *Thrips* Linnaeus (1758) [5] and they all belong to the Family Thripidae Stephens (1829), Sub-family Thripinae Stevens (1829) [48] and the Tribe Thripini

Stevens (1829) [48], (Table 3). The identified species are *Thrips angusticeps* Uzel (1895) [49], *T. Tabaci* Lindemann (1888) [50], *T. imaginis* Bagnall (1926) [51], *T. Palmi* Karny (1925) [52], *T. australis* Bagnall (1915) [53], *T. Meridionalis* Priesner (1926) [54] and *T. fuscipennis* Haliday (1836) [55]. (Table 3, Figure 3).

Table 3: List of species of the genus *Thrips* identified on weed species in different locations in governorate of Zaghouan in Tunisia

Order	Sub-order	Family	Sub-family	Tribe	Genus	Species	Figures
Thysanoptera	Terebrantia	Thripidae	Thripinae	Thripini	<i>Thrips</i>	<i>angusticeps</i>	Figure 3. A
						<i>tabaci</i>	Figure 3. B
						<i>imaginis</i>	Figure 3. C
						<i>palmi</i>	Figure 3. D
						<i>australis</i>	Figure 3. E
						<i>meridionalis</i>	Figure 3. F
						<i>fuscipennis</i>	Figure 3. G

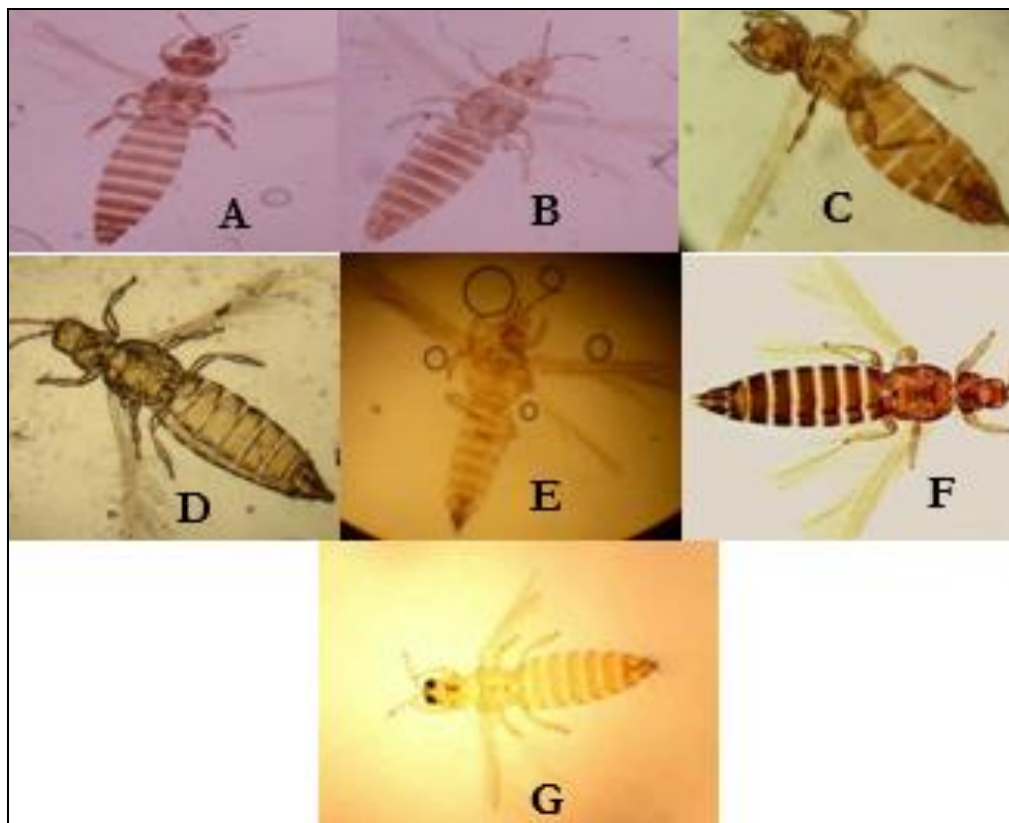


Fig 3: Thrips species of the genus thrips encountered on weed host plants species in different locations in the governorate of Zaghouan in Tunisia (AT *angusticeps*, BT *tabaci*, CT *imaginis*, DT *palmis*, ET *australis*, FT *meridionalis*, GT *fuscipennis*)

The most important and representative thrips species is *T. tabaci* during the three years, followed by *T. angusticeps* and *T. fuscipennis* (Figure 4) (Table 4). *T. tabaci* was a eudominant thrips species during three years of investigations with an average percentage of about 81.7% (Table 5). *T. angusticeps* and *T. fuscipennis* were classified as dominant thrips species according to their total dominance (Table 5).

The other species were occasional with an average total number comprised between 7 and 22%. In 2019, total thrips number was very important compared with 2020 and 2021. *T. tabaci*, as the most important species, was encountered on weed species with a total number of about 1647 in 2019, then total number decreased considerably in 2020 to 612, to decrease later in 2021 reaching 1284 (Table 4).

Table 4: Frequency of thrips species identified on weeds species in different locations in governorate of Zaghouan in Tunisia.

Species	Specimen number in 2019	Percentage in 2019	Specimen number in 2020	Percentage in 2020	Specimen number in 2021	Percentage in 2021	Total average specimen number	Total Percentage
<i>T. angusticeps</i>	143	7.37	86	11.05	106	6.72	111.66	8.38
<i>T. tabaci</i>	1647	84.98	612	78.66	1284	81.47	1181	81.70
<i>T. imaginis</i>	14	0.72	0	0	9	0.57	7.66	0.43
<i>T. palmi</i>	22	1.13	3	0.38	8	0.50	11	0.67
<i>T. australis</i>	37	1.90	8	1.02	22	1.39	22.33	1.44
<i>T. meridionalis</i>	8	0.41	17	2.18	11	0.69	12	1.09
<i>T. fuscipennis</i>	67	3.45	52	6.68	136	8.62	85	6.25
Total	1938	100	778	100	1576	100	1430.66	100

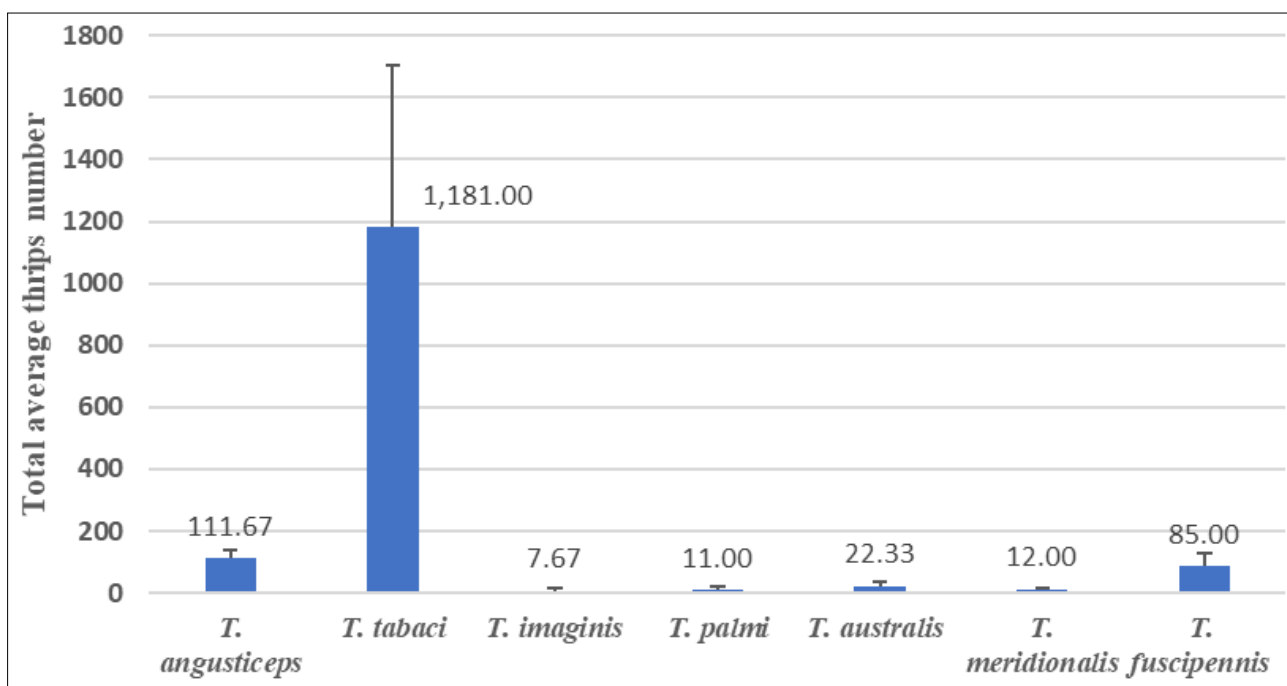


Fig 4: Total average of thrips species identified on weeds species in different locations in governorate of Zaghouan in Tunisia.

Table 5: Dominance of thrips species identified on weeds species in different locations in governorate of Zaghouan in Tunisia. Legend; (+++++) subdominants (> 10%), (++++) dominants (5.1 to 10%), (++++) subdominants (2.1 to 5%), (++) recedents (1 to 2%) and, (+) subrecedents (< 1%), (-) absent.

Species	Frequency in 2019	Dominance in 2019	Frequency in 2020	Dominance in 2020	Frequency in 2021	Dominance in 2021	Total frequency	Total dominance
<i>T. angusticeps</i>	7.37	++++	11.05	+++++	6.72	++++	8.38	++++
<i>T. tabaci</i>	84.98	+++++	78.66	+++++	81.47	+++++	81.70	+++++
<i>T. imaginis</i>	0.72	+	0	-	0.57	+	0.43	+
<i>T. palmi</i>	1.13	++	0.38	+	0.50	+	0.67	+
<i>T. australis</i>	1.90	++	1.02	++	1.39	++	1.44	++
<i>T. meridionalis</i>	0.41	+	2.18	+++	0.69	+	1.09	++
<i>T. fuscipennis</i>	3.45	+++	6.68	++++	8.62	++++	6.25	++++

Weed species host-plant range of thrips species of the genus *Thrips*

Thirty-one weed species belonging to 16 botanical families were sampled and identified in the different localities of the

governorate of Zaghouan in Tunisia. However, only 26 weed species were recognized as host plants for recorded thrips species. Table 6 reports each thrips species associated with its weed host plants.

Table 6: Weeds host plant range of thrips species collected from different locations in governorate of Zaghouan in Tunisia.

Thrips species	Botanical family	Host plant species	
<i>T. Angusticeps</i>	Poaceae	<i>Phalaris canariensis</i>	
		<i>Cynodon dactylon</i>	
	Amaranthaceae	<i>Amaranthus albus</i>	
	Asteraceae		<i>Anacysclus clavatus</i>
			<i>Chrysanthemum coronarium</i>
			<i>Calendula arvensis</i>
			<i>Calendula officinalis</i>
			<i>Cynara cardenculus</i>
	Fabaceae		<i>Vicia sativa</i>
			<i>Lotus edulis</i>
		<i>Medicago sativa</i>	
Geraniaceae	<i>Geranium tuberosum</i>		
Primulaceae	<i>Anagallis arvensis</i>		
Malvaceae	<i>Malva sylvestris</i>		
<i>T. Tabaci</i>	Poaceae	<i>Phalaris canariensis</i>	
		<i>Avena stririlis</i>	
		<i>Cynodon dactylon</i>	
		<i>Bromus rigidus</i>	
	Asteraceae	<i>Chrysanthemum coronarium</i>	
		<i>Anacysclus clavatus</i>	
		<i>Calendula arvensis</i>	
		<i>Calendula officinalis</i>	
		<i>Cynara cardenculus</i>	
	Brassicaceae	<i>Sinapis arvensis</i>	
		<i>Diploaxis muralis</i>	
	Chenopodiaceae	<i>Chenopodium album</i>	
	Convolvulaceae	<i>Convolvulus arvensis</i>	
	Fabaceae	<i>Vicia sativa</i>	
		<i>Medicago sativa</i>	
		<i>Melilotus indica</i>	
		<i>Lotus edulis</i>	
	Geraniaceae	<i>Geranium tuberosum</i>	
	Papaveraceae	<i>Papaver rhoeas</i>	
Plantaginaceae	<i>Plantago lagopus</i>		
Primulaceae	<i>Anagallis arvensis</i>		
	<i>Anagallis monelli</i>		
<i>T. Imaginis</i>	Asteraceae	<i>Chrysanthemum coronarium</i>	
		<i>Calendula arvensis</i>	
	Brassicaceae	<i>Sinapis arvensis</i>	
Malvaceae	<i>Malva sylvestris</i>		
<i>T. Palmi</i>	Asteraceae	<i>Chrysanthemum coronarium</i>	
		<i>Calendula arvensis</i>	
	Brassicaceae	<i>Sinapis arvensis</i>	
	Convolvulaceae	<i>Convolvulus arvensis</i>	
Geraniaceae	<i>Geranium tuberosum</i>		
<i>T. Australis</i>	Asteraceae	<i>Anacysclus clavatus</i>	
		<i>Chrysanthemum coronarium</i>	
		<i>Calendula arvensis</i>	
<i>T. Meridionalis</i>	Poaceae	<i>Avena stririlis</i>	
		<i>Bromus rigidus</i>	
	Asteraceae	<i>Chrysanthemum coronarium</i>	
		<i>Calendula arvensis</i>	
Brassicaceae	<i>Silybum marianum</i>		
	<i>Diploaxis muralis</i>		
<i>T. Fuscipennis</i>	Asteraceae	<i>Chrysanthemum coronarium</i>	
		<i>Calendula arvensis</i>	
		<i>Calendula officinalis</i>	
		<i>Cynara cardenculus</i>	
	Geraniaceae	<i>Geranium tuberosum</i>	
Apiaceae	<i>Foeniculum vulgare</i>		

Discussion

The most abundant and frequent species that was reported during this inventory is the onion thrips *T. tabaci*. It was observed occurring on many weed species. The onion thrips

is a cosmopolitan species that had been mentioned in the five continents [16]. During this inventory, *T. tabaci* has been encountered on 22 weed species belonging to 10 different botanical families. In fact, it is a polyphagous species that

may attack more than 29 plant families and considered as a pest causing several economic damages on many crops [16, 20].

Adults are macropterous and variable in colors from yellow to brown. Head is wider than long. Antennae have seven articles, the first one is clearer than the second. Antennal segment III and IV have forked sensory cones. Pronotum with two pairs of prominent postero-angular setae and posterior margin with 3 to 4 pairs of setae. Metanotum generally is irregularly reticulate centrally with lines covering the central point in the posterior margin and absence of campaniform sensilla. Forewing has a main vein generally with 4 setae in the distal part while the second vein has about 15 setae. Abdominal tergites II is with 3 lateral marginal setae. Tergites V to VIII with a pair of ctenidia which is posterolateral to the spiracle. Tergite VIII is with a full comb of long and slender microtrichia. Pleurotergites lack discal setae but with thin lines of microtrichia. Sternites II with two pairs of marginal setae, III to VII have three pairs [17, 29, 30].

T. angusticeps is the second species of the genus *Thrips* considered as frequent and dominant. This thrips species is polyphagous and may occur on many host plants belonging to several botanical families especially Poaceae, Fabaceae, Brassicaceae, Solanaceae, Liliaceae, Asteraceae, Rosaceae and Rutaceae [11, 16, 33, 35]. *T. angusticeps* had been mentioned in almost all European countries from Finland and Britain to South Spain. Also observed in parts of North Africa including Tunisia. *T. angusticeps* is also observed in some countries of the Near-East [4, 16, 33, 35]. Regarding systematic, adults of *T. angusticeps* are brown to dark brown in color. Antennae are with seven articles with segment III lighter than the others. Females are hemimacropterous, macropterous to brachypterous. Distal part of the main vein of the forewing is with 5 to 7 setae. Tergite II with 3 pairs of lateral setae. The interocellar setae are situated outside the ocellar triangle. Pronotum is with 4 pairs of setae in the posterior edge. Metanotum is striated with campaniform sensilla [17, 33].

T. fuscipennis also known as rose thrips, is considered as a dominant thrips species on weed hostplants in the different locations in the governorate of Zaghuan, colonizes a wide range of botanical species and predominant on Rosaceae. It may occur on leaves of some arboreal species, citrus fruits and beans.

T. fuscipennis colonizes a wide range of botanical species and predominates in the Rosaceae family. Also found on the leaves of some arboreal species, citrus fruits and beans [17, 33]. The rose thrips exists throughout the Palearctic zone and was found in most warm to temperate regions of Europe. This species had been also reported in North American continent [17, 33].

Adults of *T. fuscipennis* are dark in color. Antennae with 7 articles with segment III and the basal half of segment V is lighter. The distal part of the forewing has 2 to 5 setae. Tergites II is with 4 pairs of lateral setae. The posterior edge of the pronotum is with 3 pairs of setae. The metanotum is reticulate with a pair of campaniform sensilla [17, 33].

Regarding recedent thrips species found on weed hostplants in the governorate of Zaghuan, *T. australis*, also known as *Isoneurothrips australis* and the gum tree thrips, originating from Australia [17, 42], it has been cited for the first time in different parts of Tunisian territory in 2014 [9]. *T. australis* had been reported in different countries in Europe such as

Spain, Portugal and Britain [7, 16, 35, 41, 46]. Reported also in Africa as in Egypt, Kenya, South Africa and Reunion [28, 39]. In Asia such as Cyprus, Iran, Japan, Malaysia and China [44, 22, 23, 24, 32, 47]. *T. tabaci* is mentioned also in North America in the United States [34], in Central and South America such as in Cuba, Brazil and Chile [3, 12, 25]. The gum tree thrips is associated generally with white flowers of *Eucalyptus* [29, 31]. This species also mates on flowers of Myrtaceae and colonizes crops surrounding *Eucalyptus* plantations [28, 29] such as tomato, pepper, bean, sunflower, carrot, and citrus crops [22, 35].

T. australis adults are variable in color from yellow to brown. Generally, the head is yellow with an obscure occipital crest. The pronotum is yellowish brown in color and the median area of tergites and the last three abdominal segments are brown. Antennae with 7 articles. Segments VII and VI are bullet shaped. Segment I and half of III are yellow and the rest is brown. The forewing is pale in color with dark setae. The first and second vein of the forewing are each formed by a continuous line of setae. Pronotum with two pairs of short postero-angular setae. Metanotum is clearly reticulated with median setae behind anterior margin with campaniform sensilla. Tergite VIII is with a continuous comb. The pleurotergites are with discal setae. Sternites with more than 30 discal setae. Males are similar to females but with glandular areas on sternites III to VII [16, 22, 28, 29].

T. meridionalis was encountered on three weed botanical families during this study (Poaceae, Asteraceae and Brassicaceae). It is a polyphagous thrips species capable of attacking a wide range of plants. It can be found on fruit trees, shrubs and herbaceous plants. Among hosts on which it was cited; *Prunus persica*, *Citrus* spp., *Cucumis sativus*, *Amaryllis* sp., *Rosa regosa*, *Vicia faba*, *Allium cepa*, *Cardaria Lepidium* and *Silybum marianum* [2, 11, 16, 17, 35].

T. meridionalis is distributed in many European countries and very abundant in the Mediterranean basin and central Europe. Also found in Iraq, Iran, Turkey and Lebanon. It is also distributed in different countries of North Africa [5]. Adults of *T. meridionalis* are generally brown in color and have 8 antennae segments. The interocellar setae are large and located at the edge of the ocellary triangle. The accessory setae of sternites VI and VII are irregularly distributed. Three setae in the distal part of the main vein of the forewing. The metanotum is centrally ribbed and with a pair of campaniform sensilla. Presence of glandular areas in the abdominal sternites of males [17].

T. palmi, or melon thrips, is widespread on many hostplants in different parts of the world such as in Asia, Africa, Australia, Central America, South America, Europe and Pacific Islands. It was cited on horticultural crops such as melon, watermelon, cucumber, eggplants and onion. It attacks also ornamental crops such as hibiscus and Chrysanthemum. On the other hand, it may occur on cotton, peanut, and soy [16]. In Tunisia, it has been mentioned on grapevine orchards [10]. Adults are completely clear except terminal antennal articles that are brown. Antenna are formed by 7 articles. The antennal segment VII is smaller than the others. Interocellar setae are situated outside the ocellary triangle [16].

T. imaginis, also known as plague thrips, though it was not found on many weed species during this study, but it is considered as a polyphagous pest species of many crops such as apple and grapevine. It has been cited in Australia, New Zealand, in Europe and North Africa including Tunisia

[10, 16]. Adults are light in color or with head and thorax lighter than the abdomen. Seven antennal articles. Metanotum reticulated with pair of campaniform sensilla. Pronotum with pair of postero-angular setae. Forewings with a continuous vein of seta. Sternite II with three pairs of postero-marginal seta [16].

Conclusion

Seven thrips species belonging to the genus *Thrips* were detected on weed species occurring in different locations in the governorate of Zaghouan in Tunisia during three years of investigation (2019, 2020 and 2021). These polyphagous and phytophagous species are *Thrips tabaci* Lindemann (1888) [50], *T. angusticeps* Uzel (1895) [49], *T. fuscipennis* Haliday (1836) [55], *T. australis* Bagnall (1915) [53], *T. meridionalis* Priesner (1926) [54], *T. palmi* Karny (1925) [52] and *T. imaginis* Bagnall (1926) [51]. The most important and abundant thrips species is *T. tabaci* followed by the two recedent species *T. angusticeps* and *T. fuscipennis*. These species were collected on 26 among 31 sampled weed species from the governorate of Zaghouan. This study is necessary in order to develop an Integrated Pest Management strategies against thrips and their hostplants.

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