



## Survey and management of the eriophyid mite *Aceria oleae* Nalepa (Acari: Eriophyidae) in Tunisia olive groves

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### Abstract

The eriophyid mite *Aceria oleae* is a serious pest of olive groves causing significant damages to several parts of olive trees (leaves, buds, flowers or fruits). The aim of this work was to study the population dynamics of this pest and to evaluate the effectiveness of some pesticides (*Bacillus thuringiensis* (*Bt*), azadirachtin (0.03%) + neem oil (90.5%), abamectin and acrinathrin) in Tunisia olive groves. Our results demonstrated that this pest was able to perform up to three generations on the leaves of olive trees. *Aceria oleae* mites preferred the lower side of the leaves of olive oil or table olive varieties. Furthermore, all tested insecticides were efficient in reducing damages caused by this pest (53.15; 71.97; 76.78 and 83.09% respectively for *Bt*, azadirachtin combined with neem oil, abamectin and acrinathrin). Obtained data may help Tunisian farmers to detect early attacks and to apply effective pesticides.

### 1. INTRODUCTION

The olive bud mite *Aceria oleae* Nalepa (Acari, Eriophyidae) is one of the most harmful pest that may cause significant losses to olive plantations in nurseries or open fields (Abou-Awad et al., 2005; Chatti-Kolsi et al., 2016). It prefers warm areas and may feed on olive leaves, buds, flowers or fruits causing characteristic damages as deformation of leaves and deformation of fruits (Elhadi et al., 1997; Elmoghazy and Alhaithloul, 2023; Çetin et al., 2010). This eriophyid mite was characterized by its small size (100-200 µm) making its identification difficult (Chatti et al., 2017; Sergio and Moraes, 2020). Adults are vermiform, slightly curved and had a pale yellow color (Sergio and Moraes, 2020). Larvae are white and smaller than adults (Sergio and Moraes, 2020). Despite, *Aceria oleae* was reported in Tunisia since 1993 (Chatti et al., 2017), chemical control is still the main method used to manage this pest despite its negative side effects on human health and biodiversity (Ksantini et al., 1993). Little is known also about its bioecology in Tunisia. Therefore, the aim of this work

was firstly to study the population dynamic of *A. oleae* on olive oil and table olive trees and secondly to test the effectiveness of some biological and chemical pesticides against this pest in Tunisia olive groves.

### 2. MATERIALS AND METHODS

#### 2.1 Study site

The study was carried out at the wood yard (3.5 ha) of the national oil office of Tunisia located in Bejoua (Governorate of Manouba) planted with local and some foreign varieties of olive trees.

Population dynamic of the mobile stages of *A. oleae* mites was surveyed from early February to early June 2024 on both olive oil (cv. Chemleli, Chetoui, Koroneiki, Chemcheli, Frenjivento, Arbequina, Jarbouï, Zalmati, Coratina, Arbosana, Oueslati, Frontoio, Zarrazi, Letcino, Rkhami and Sayali) and table olive (cv. Meski, Picholine, Ascolana, Manzanilla, Bidh H'mam, Neb Jmel, Besbessi, Marsaline and Calamata) varieties. Five branches

were harvested from one olive tree of olive oil and table olive varieties. All olive trees were drip irrigated.

## 2.2 Pesticide sprays

The efficacy of two chemical and two biological pesticides was tested herein against the mobile stages of *A. oleae* mites (Table 1).

Model (GLM) model. Data related to the efficacy of the tested pesticides toward the eriophyid mites were subjected to One-way anova. Multiple comparisons were assessed using the Duncan Post-hoc test. All statistical analysis were performed using IBM SPSS for Windows version 21.0 (SPSS Inc., 2012).

**Table 1.** Pesticides used against *A. oleae* mites

Active ingredient (A.I)	Concentration of the A.I	Formulation	Trade name	Dose
<i>Bacillus thuringiensis</i>	16000 UI/mg	WP	Toutastop®	4 g/L
Azadirachtin (0.03%) + Neem oil (90.5%)	0.3 g/L	EC	Nimbecidine®	4 mL/L
Abamectin	18 g/L	EC	Vertimec®	2.5 mL/L
Acrinathrin	75 g/L	EW	Rufast 7.5 ®	0.60 mL/L

The tested concentrations were chosen based on laboratory bio-assays. To do so, five blocks were selected. Each block contained three olive oil trees (cv. Koroneiki). Three olive trees were kept as untreated control. The acaricide 'acrinathrin', considered herein as a positive control, was already commercialized in Tunisia for the control of eriophyid mites in olive groves at a rate of 60 mL/hL (www.agritunisie.com). The pesticides were applied on 13/05/2024 using a hydraulic knapsack hand sprayer of 10 liters. Treatment efficacy was evaluated by harvesting 25 olive leaves from each treated and untreated trees. Counting of the mobile stages of *A. oleae* was realized in the laboratory by inspecting the both sides of olive leaves using a binocular microscope. Populations were recorded 1, 7, 14 and 21 days after treatment. Percentage mortality was calculated following the Abbott's formula:

Efficacy Rate =  $((T_0 - T_t) / T_0) \times 100$ , with  $T_0$ : number of the mobile stages of *A. oleae* on untreated olive trees;  $T_t$ : number of the mobile stages of *A. oleae* on treated olive trees.

## 2.3 Statistical analysis

The data were checked for homogeneity and normality using Levene and Shapiro-wilk tests respectively. The effect of olive varieties and the side of olive leaves on the number of the recorded eriophyid mites was analyzed using the univariate analysis of variance following the General Linear

## 3. RESULTS

### 3.1 Population dynamics of *A. oleae* mites

#### 3.1.1 Olive oil varieties

Population dynamics of the mobile stages of *A. oleae* revealed the presence of three generations on the lower side of olive leaves of 'Koroneiki', 'Chemleli' and 'Arbequina' varieties recorded on February-March, April (Fig. 1).

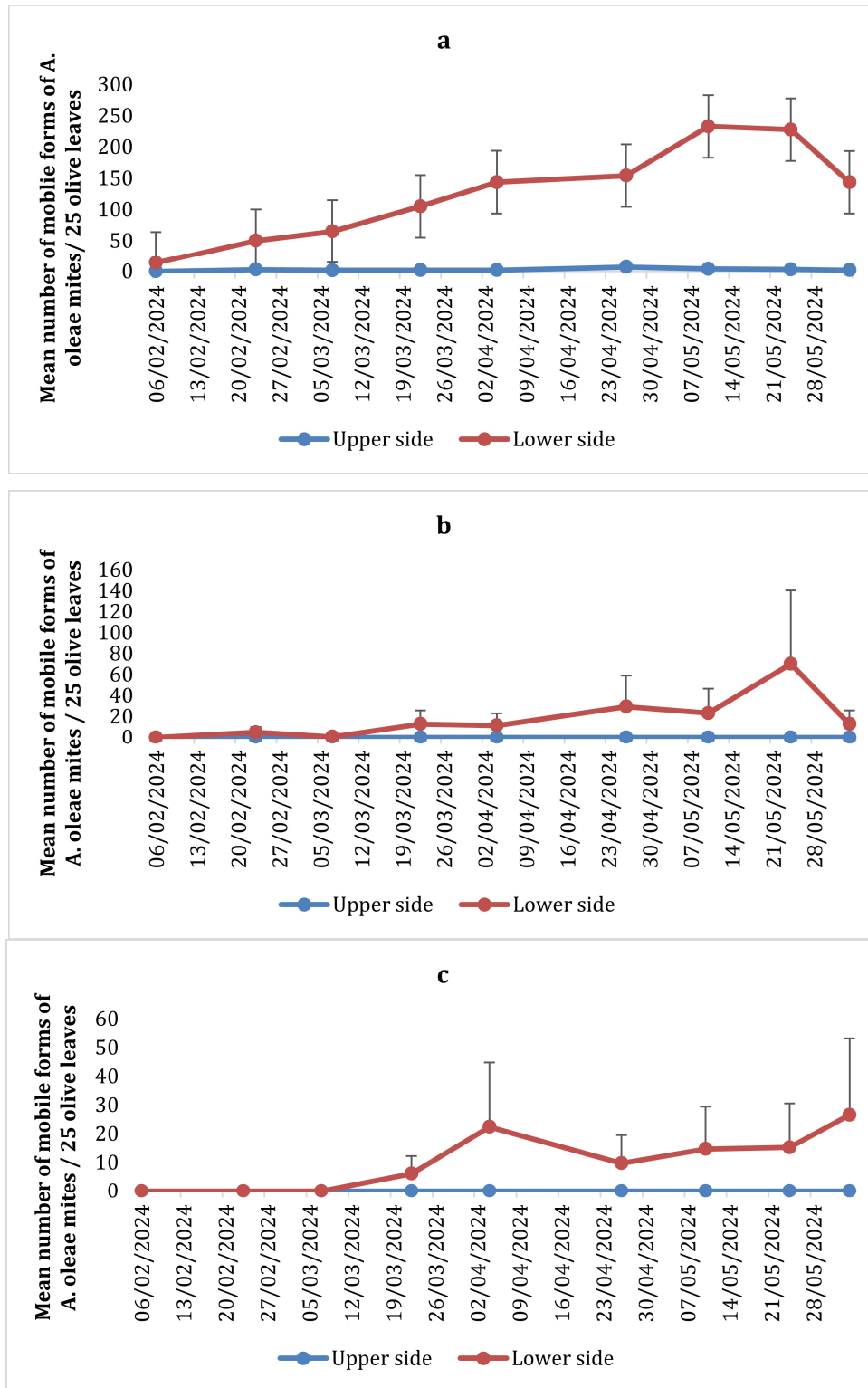
Moreover, our result indicated that the olive oil varieties ( $F = 207.62$ ;  $df = 8$ ;  $P < 0.0001$ ), the side of olive leaves ( $F = 37.59$ ;  $df = 1$ ;  $P < 0.0001$ ) and their interaction ( $F = 190.29$ ;  $df = 8$ ;  $P < 0.0001$ ), had a significant effect on the number of eriophyid mites.

#### 3.1.2 Table olive varieties

Our study highlighted the occurrence of two generations of the mobile stages of *A. oleae* registered on April and May (Fig. 2).

Statistical analyses showed that the table olive varieties ( $F = 74.99$ ;  $df = 7$ ;  $P < 0.0001$ ), the side of olive leaves ( $F = 16.24$ ;  $df = 1$ ;  $P < 0.0001$ ) and their interaction ( $F = 49.97$ ;  $df = 7$ ;  $P < 0.0001$ ), had a significant effect on the number of eriophyid mites.

Our data showed that the highest number of *A. oleae* mites were significantly found on the lower compared to the upper side of olive leaves ( $(F_1,$



**Fig. 1.** Population structure of *A. oleae* on three olive oil varieties (a=Koroneiki, b=Chemleli, c=Arbequina)

$F_{1, 161}=10.70, P=0.001$ ) and ( $F_{1, 143}=8.57, P=0.004$ ) respectively for olive oil varieties and table olive varieties) (Fig. 3).

Moreover, olive oil varieties are significantly more damaged by the eriophyid mites than table olive varieties ( $F_{1, 305}=8.57, P=0.008$ ) (Fig. 3). Koroneiki was significantly the most infested olive oil variety compared to the other ones (Chemleli, Chetoui,

Freijvento, Arbequina, Jarbouï, Zalmata, Coratina, Arbosana, Ouesleti, Zarrazi, Rkhami and Sayali) ( $F_{8, 80}= 22.123; P<0.001$ ) (Fig. 3a). Attacks were significantly higher on “Picholine” and “Meski” varieties compared to the other varieties (Ascolana, Manzanilla, Bidh H’mam, Neb jmal, Marsaline and Calamata) ( $F_{7, 71}= 7.87; P<0.001$ ) (Fig. 3b).

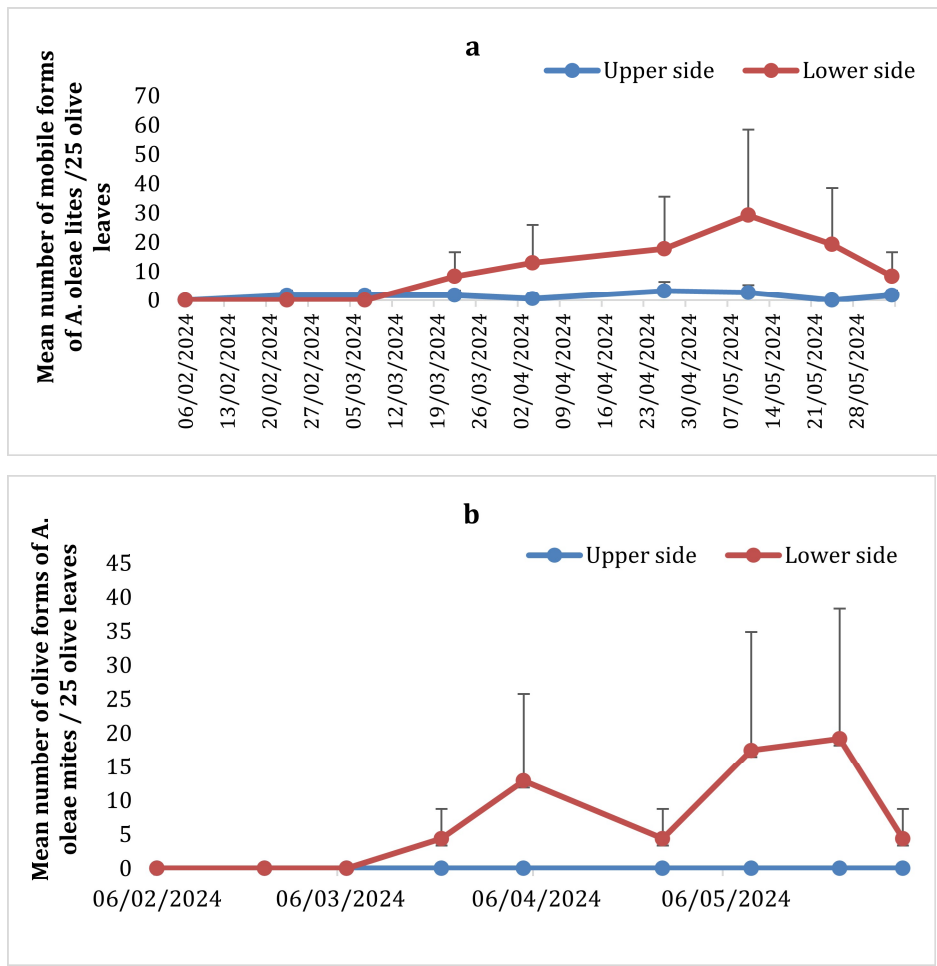


Fig.2. Population structure of *A. oleae* on two table olive varieties (a= Meski, b=Picholine)

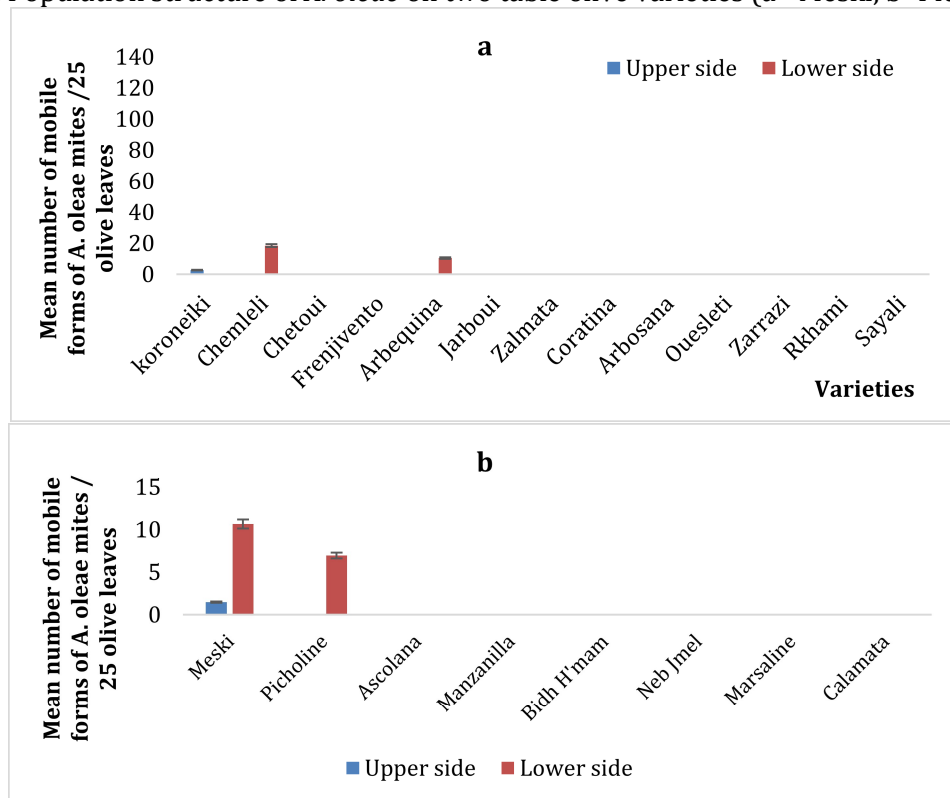


Fig.3. Leaf density of mobile stages of *A. oleae* mites in olive grove (a=olive oil varieties, b=table olive varieties)

### 3.2 Efficacy of the tested pesticides on *A. oleae*

All tested insecticides showed significant efficacy in reducing the number of the mobile stages of *A. oleae* (Fig. 4).

One-way anova indicated that there was a significant difference between the tested insecticides and the untreated control under field condition ( $F_{5, 35}=2.90$ ;  $P=0.03$ ). The acaricide “acrinathrin” was proved to be the more efficient insecticide (up to 83% of efficacy) compared to other ones (Table 2). However, the *B. thuringiensis* were the less efficient and its efficacy ranged from 42.39% to 53.15% during the trial (Table 2).

### 4. DISCUSSION

The occurrence of eriophyid mites on olive trees is always considered a major problem in Tunisia and other countries around the world (Keifer, 1939; Jeppson et al., 1975; Reis et al., 2011; Ricalde et al.,

2012; Chatti-Kolsi et al., 2016). Thus, knowledge of their population dynamics may help farmers to perform effective control management tools. Our data demonstrated that *A. oleae* was able to perform up to three generations recorded on February-March, April and May on the two olive oil varieties (Koroneiki and Chemleli). However, only two generations were registered on the olive table varieties (Meski and Picholine). Our results are almost similar to those obtained by Ersin et al., (2010) who have demonstrated that the highest density of *A. oleae* was recorded on April, May and June in Turkey. Recently, Elmoghazy and Alhaithloul (2023) indicated that the population density of eriophyid mites began to rise at the beginning of March and peaked in June in olive trees in Saudi Arabia. Overall, it is clearly shown that *A. oleae* was more active in the spring which may be linked to the climatic conditions always favorable to its development as the case of Tunisia

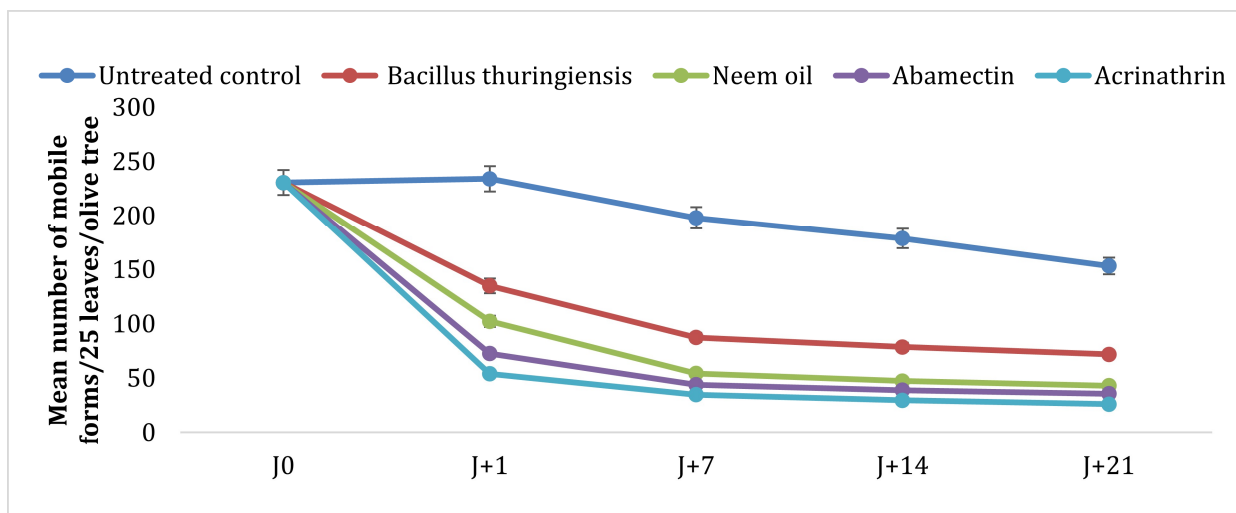


Fig.4. Effect of the tested insecticides on the mobile forms of *A. oleae*

Table 2. Efficacy rate of the tested insecticides on the mobile forms of *A. oleae* at 1, 7, 14 and 21 days after treatment

Days After the Treatment	Efficacy rate (%)				Untreated control
	<i>Bacillus thuringiensis</i>	Azadiracthin	Abamectin	Acrinathrin (Positive control)	
D+1	42.39	56.34	69.02	76.95	-
D+7	55.88	72.59	77.86	82.48	-
D+14	56.02	73.57	78.27	83.52	-
D+21	53.15	71.97	76.78	83.09	-

and other countries in the world (Abou-Awad et al., 2005; Shahini et al., 2009; Ersin et al., 2010; Al-Atawi and Halawa, 2011; Chatti-Kolsi et al., 2016; Elmoghazy, 2016; Kaya, 2020).

Our results highlighted the strong preference of *A. oleae* to develop on the underside compared to the upper side of olive leaves which confirm results of Chatti-Kolsi et al., (2016).

Furthermore, we demonstrated that olive oil varieties are significantly more susceptible to *A. oleae* attacks compared to table olive varieties. Our findings are totally in agreement with those obtained by Chatti et al., (2016). In fact, according to these authors, the varieties 'Chetoui, Picholine, Oueslati and Zarrazi' (table olive varieties) were less damaged by the eriophyid mites (*A. oleae* and *Oxyencus maxwelli* Keifer) compared to 'Arbequina, Chemlali Ontha and Koroneiki' (olive oil varieties). In Tunisia, *A. oleae* is always active in association with *O. maxwelli* usually found on the upper side of the olive leaves (Chatti-Kolsi et al., 2016; Chatti et al., 2017).

All tested insecticides herein, showed efficacy in reducing damages caused by *A. oleae* on olive trees. However, the two chemical pesticides showed the highest mortality level of the mobile stages of *A. oleae* (78.27 and 83.52 % respectively for abamectin and acrinathrin after 14 days of the treatment). Azadirachtin exhibited high toxicity toward the eriophyid mite compared to *Bacillus thuringiensis* (*Bt*). A number of research articles already indicated the great efficacy of applying abamectin and azadirachtin for the control of *A. oleae* mites. In this context, Abou-Awad et al., (2005) demonstrated recently that damages caused by *A. oleae* mites decreased after application of abamectin at a dose of 764 g/ha in olive nursery in Egypt. According to Kumral et al., (2021) azadirachtin applied at a rate of (1.5 mg/L) induced high mortality level (>75%) of *A. oleae* adults under laboratory conditions.

Concerning the acaricide 'acrinathrin', it is always commercialized for the control of eriophyid mites in olive orchards (FAO/BERD, 2019).

Few research studies are conducted to evaluate the toxicity of *Bt* toward mites. As far as we know, there is no published papers studying the impact of *Bt* on *A. oleae* mites. However, the toxicity of this biological pesticide was already tested against *Tetranychus urticae* Koch (Acari: Tetranychidae) larvae and adults at a concentration of 1% showing high efficacy (>99% of mortality) under laboratory conditions (Zenkova et al., 2020).

## 5. CONCLUSIONS

The present work stressed the importance of studying the population dynamics as well the preferences of *A. oleae* mites toward the olive varieties in order to plan effective management tools. Our results demonstrated that both chemical and biological pesticides gave promising results in reducing the infestation level in the field. Adopting biological pesticides in pest management strategies can be considered usually as environmentally eco-friendly natural products for sustainable management strategies. Hence, the choice of effective pesticides taking into account the biology of the pest as well the impact of climate changes on the ecosystem level should be carefully studied for effective inclusion in IPM strategies.

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## REFERENCES

- Abou-Awad, B.A., Metwally, A.M., and Al-Azzazy, M.M. (2005). Environmental management and biological aspects of two eriophyid olive mites in Egypt: *Aceria oleae* and *Tegolophus hassani*. *Journal of Plant Diseases and Protection* 112 (3), 287–303.
- Al-Atawi, F. J., and Halawa A.M. (2011). New records of eriophyid mites (Acari: Prostigmata: Eriophyoidea) from Saudi Arabia. *Pakistan Journal of Biological Sciences* 14 (2), 112-117. <https://doi.org/10.3923/pjbs.2011.112.117>.
- Chatti-Kolsi, A., Chelli-Chaabouni, A., and Ksantini, M. (2016). Effet de l'anatomie de la feuille sur l'évolution des acariens ériophyides de l'olivier en Tunisie. *Cahiers Agricultures* 25, 45003. <https://doi.org/10.1051/cagri/2012026>.
- Chatti, A., Kreiter, S., Lebdi-Grissa, K., and M. Ksantini. (2017). Phytophagous and predatory mites on olive trees in Tunisia. Catalogue, description of one new species and key for identification (Acari, Eriophyidae, Tetranychidae, Tenuipalpidae and Phytoseiidae). *Acarologia* 57 (2), 233-254. <https://doi.org/10.1051/acarologia/20164152>.
- Çetin, H., Arslan, D., and Ozcan, A. (2010). Influence of eriophyid mites (*Aculus olearius* Castagnoli and *Aceria oleae* Nalepa (Acarina: Eriophyidae) on some physical and chemical characteristics of variety olive fruit. *Journal of the Science of Food and Agriculture* 91, 498–504.
- Elhadi, F.A., Birger, R., Metzidakis, I.T., and Voyiatzis, D.G. (1997). A new approach to the control of the

- olive mite *Aceria (Eriophyes) oleae* Nalepa in olive trees. *Acta Horticulturae* 2, 555–557.
- Elmoghazy, M.M.E. and Alhaithloul H.A.S. (2023). Survey and population density evaluation of olive trees mites with application of some integrated control of mites pests. *Journal of Animal and Plant Sciences* 33(5), 1158-1168. <https://doi.org/10.36899/JAPS.2023.5.0709>.
- Elmoghazy, M.M.E. (2016). Survey and taxonomy of mites associated with fruit orchards trees from Sakaka governorate, Kingdom of Saudi Arabia. *International Journal of Agriculture and Biosciences* 5(6), 341-346. <https://doi.org/10.21608/eajbsz.2014.13482>.
- Ersin, F., Kaptan, S., Erten, L., Kokturk, H., Gumusay, B., Denizhan, E., and Cakmak, I. (2020). Mite diversity and population dynamics of eriophyid mites on olive trees in Western Turkey. *Turkish Journal of Entomology* 44 (1),123-132. <http://dx.doi.org/10.16970/entoted.649116>.
- FAO/BERD. (2019). Huile d'olive tunisienne: Libérer le potentiel grace au développement de la chaine de valeur: Ravageurs touchant la qualité de l'huile. 77pp. <https://agivate.org/wp-content/uploads/2023/10/Ravageurs-touchant-la-qualite-de-lhuile.pdf>.
- Jeppson, L.R., Keifer, H.H., and Baker, EW. (1975). Mites injurious to economic plants. Berkeley, USA: University of California Press.
- SPSS. (2012). SPSS 21.0 brief guide. SPSS Incorporation, Chicago.
- Kaya, K. (2020). Seasonal population dynamics of *Aceria oleae* (Nalepa, 1900) (Acari: Eriophyidae) in generative organs of olives in Hatay Province, Turkey. *Turkish Journal of Entomology* 44(4), 503-512. <http://dx.doi.org/10.16970/entoted.749815>.
- Keifer, H.H. (1939). Eriophyid studies III. *Bulletin of the California Department of Agriculture* 28, 144–162.
- Ksantini, M., Chaari, M., Arous, M., Ghorbel, M., and Saadaoui, C. (1993). Essais de lutte contre les acariens ériophyides sur l'olivier en Tunisie. Série notes techniques numéro 3, Sfax, Tunisie: Institut de l'olivier.
- Kumral, N.A., Cobanoglu, S., Hephizli Goksel, P., and Aksoy, A. (2021). Toxic effects of some acaricides on *Aceria oleae* (Nalepa, 1900) (Acari: Eriophyidae) and its predator *Neoseiulus californicus* (McGregor, 1954) (Acari: Phytoseiidae) under laboratory conditions. *Turkish Journal of Entomology* 45(4), 485-498. <http://dx.doi.org/10.16970/entoted.999028>.
- Leiva, S., and Moraes, G.J.DE. (2020). Redescription of *Aceria oleae* (Nalepa, 1900) (Acari: Eriophyidae) using SEM, life cycle and damage caused to leaves and fruits of *Olea europaea* cv. arauco in La Rioja province, northwestern Argentina. *Systematic & Applied Acarology* 25(11), 2003–2017. <https://doi.org/10.11158/saa.25.11.7>.
- Reis, P.R., De Oliveira, A.F., Navia, D. (2011). First record of the olive bud mite *Oxycenus maxwelli* (Keifer) (Acari: Eriophyidae) from Brazil. *Neotropical Entomology* 40(5), 622–624.
- Ricalde, M.P., Garcia, F., Nava, D., Loeck, A.E., Guimarães, M.D.R., and Coutinho, E.F. (2012). *Oxycenus maxwelli* (Keifer) (Acari: Eriophyidae) damaging olive tree, *Olea europaea* L., in Rio Grande do Sul State. *Ciencia Rural Santa Maria* 42(5), 767–769.
- Shahini, S., Kullaj, E., Çakalli, A., and de Lillo, E. (2009). Preliminary survey and population dynamics of some eriophid mites (Acari: Eriophyoidea) associated with olives in Albania. *International Journal of Acarology* 35(5), 419–423. <https://doi.org/10.1080/01647950903334277>.
- Zenkova, A.A., Grizanova, E.V., Andreeva, I.V., Gerne, D.Y., Shatalova, E.I., Cvetcova, V.P., and Ivan M. (2020) Effect of fungus *Lecanicillium lecanii* and bacteria *Bacillus thuringiensis*, *Streptomyces avermitilis* on two-spotted spider mite *Tetranychus urticae* (Acari: Tetranychidae) and predatory mite *Phytoseiulus persimilis* (Acari: Phytoseiidae). *Journal of Plant Protection Research* 60 (4), 415-419. <https://doi.org/10.24425/jppr.2020.134917>.