Persian J. Acarol., 15(3): 150306.

https://www.persianacarology.org
Research Article
https://biotaxa.org/pja
https://doi.org/10.22073/pja.150306

Weed plants as alternative sources of infestation for the date palm mite *Oligonychus afrasiaticus* (Acari: Tetranychidae) in the Ziban oasis, Algeria

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Received:
28 December, 2025
Accepted:
31 May, 2026
Published:
15 July, 2026
Subject Editor:
A. Farazmand

ABSTRACT

The yellow date palm mite, *Oligonychus afrasiaticus* (McGregor), commonly known as “Boufaroua” in North Africa, is one of the most destructive pests affecting date palm production in the Ziban region of southeastern Algeria. Despite its economic importance, limited information is available on the ecological role of spontaneous weed flora in maintaining mite populations and facilitating seasonal infestations of date palms. Therefore, the present study aimed to identify weed species that may serve as alternative hosts of *O. afrasiaticus*, to determine their contribution to the seasonal persistence of the mite, and to evaluate how seasonal plant phenology and spatial variation among palm groves influence infestation dynamics. A six-month field survey was conducted from February to July 2021 in seven representative palm groves of the Ziban oases. The occurrence of *O. afrasiaticus* was monitored on date palms and associated weed species in relation to seasonal dynamics and spatial variation among sites. The mite was detected in all surveyed groves, with infestation intensity varying according to microclimatic conditions and grove management practices. Among date palm cultivars, Deglet Nour exhibited the highest susceptibility. A total of 76 weed species were recorded, of which five species (*Cynodon dactylon*, *Daucus carota*, *Aster squamatus*, *Kochia scoparia*, and *Salsola tetragona*) were confirmed as alternative hosts capable of sustaining mite populations. Infestation patterns showed a clear seasonal progression, with early establishment on herbaceous weeds during spring followed by a shift toward date palms under hot and dry summer conditions. These findings demonstrate that weed communities play a significant ecological role in the persistence and spread of *O. afrasiaticus* within oasis agroecosystems and highlight the importance of integrating targeted weed management into integrated pest management strategies for sustainable date palm protection.

KEYWORDS

Alternative hosts, boufaroua, date palm, integrated pest management, oasis agroecosystems, weed flora

CITE: Deghiche-Diab, N., Benouamane, O., Ouamane, A.T., Zguerou, R., Abbas, S., Roumani, M., Mehenni, M., Rekis, A., Nia, B. & Bozdoğan, H. (2026) Weed plants as sources of infestation for the date palm mite *Oligonychus afrasiaticus* (Acari: Tetranychidae) in the Ziban oasis, Algeria. *Persian Journal of Acarology*, 15(3): 150306.
https://doi.org/10.22073/pja.150306

INTRODUCTION

The date palm (*Phoenix dactylifera* L.: Arecaceae) is a key agricultural species in arid and semi-arid regions of North Africa, where it plays a fundamental economic, ecological, and socio-cultural role. In southeastern Algeria, particularly in the Ziban region of Biskra, date palm cultivation represents the backbone of oasis agroecosystems and sustains both local livelihoods and regional agricultural productivity (Elhoumaizi *et al.* 2002; FAO 2023). However, date palm production in these environments is increasingly constrained by biotic stresses, among which arthropod pests remain a major limiting factor.

One of the most destructive pests affecting date palms in North Africa is the yellow date palm mite, *Oligonychus afrasiaticus* (McGregor), locally known as "Boufaroua". This xerophilic and polyphagous species causes severe damage to developing and ripening fruits, leading to substantial yield losses and reduced fruit quality (Howard 2001; Van den Berg *et al.* 2008; Bouguedoura *et al.* 2015). Outbreaks of *O. afrasiaticus* are strongly favored by high temperatures and low relative humidity, conditions that typify Saharan and pre-Saharan oasis systems (El-Shafie 2022). Although the economic impact of this mite has been widely documented, the ecological mechanisms underlying its seasonal persistence and spatial dispersion within oasis agroecosystems remain incompletely understood.

Increasing evidence suggests that non-crop vegetation, particularly spontaneous weed flora, can play an important role in the population dynamics of phytophagous mites by providing alternative hosts, refuge habitats, or nutritional resources during unfavorable periods (Didham *et al.* 2007; Sánchez-Bayo and Wyckhuys 2019). In North African oases, weed communities are relatively diverse during spring and early summer and may facilitate the survival of *O. afrasiaticus* outside the fruiting period of date palms. Despite this potential ecological importance, few studies have systematically evaluated the contribution of weed species to the persistence and early-season buildup of *O. afrasiaticus* populations in Algerian oasis systems, particularly in the Ziban region (Deghiche-Diab *et al.* 2025).

Therefore, this study aims to identify and evaluate weed species that may function as alternative or secondary hosts for *Oligonychus afrasiaticus* in the Ziban oases. The hypothesis of this research was that a subset of weed species present in palm groves sustains mite populations during early spring, facilitating their persistence and subsequent colonization of date palms. In addition, we examined how seasonal plant phenology and spatial variation among palm groves influence the timing, intensity, and spatial distribution of *Oligonychus afrasiaticus* infestations. Clarifying these interactions is essential for understanding the population ecology of *O. afrasiaticus* and for improving ecologically based integrated pest management strategies in oasis agroecosystems.

MATERIAL AND METHODS

Study area

The study was conducted in the Ziban region of Biskra (34.48° N, 5.44° E), located in southeastern Algeria and covering approximately 10,250 km². This region represents one of Algeria's most productive oasis-based agricultural zones and is characterized by arid climatic conditions with high summer temperatures and low relative humidity (Deghiche-Diab and Deghiche 2022a). Seven representative palm groves were selected to capture spatial variability in infestation patterns of *O. afrasiaticus*: El Hadjeb, El Ghrous, M'lili, El Outaya, Sidi Okba, M'khedma, and Bouchagroun; based on the shared agro-climatic conditions typical of Saharan and pre-Saharan oasis ecosystems in the region of Biskra, in addition to the dominance of date palm cultivation and comparable irrigation practices. However, these locations differ in palm grove structure, vegetation composition, presence of alternative host plants, soil characteristics, and management practices. Moreover, variations in microclimatic conditions and surrounding flora among these palm groves may influence the population dynamics and spatial distribution of *O. afrasiaticus*, thereby enabling a comprehensive assessment of infestation variability across the study area (Fig. 1). Geographic coordinates were recorded for each site to ensure spatial accuracy and reproducibility.

Botanical survey

A systematic survey of weed flora was conducted from March to July 2021 across the seven selected palm groves. At each site, vegetation sampling was performed within 100 m² plots following standard floristic inventory methods (Gounot 1969; Faurie *et al.* 2003). Within each plot, linear transects measuring 10 m × 1 m were established to record herbaceous, shrub, and sub-shrub species. Plant specimens were collected from all above-ground parts of the plants, including leaves, stems, flowers, and fruits when available, to ensure accurate morphological characterization. For each species, multiple samples were taken, when possible, to capture intraspecific variability. The collected material was immediately pressed in standard plant presses and dried under controlled conditions to preserve diagnostic morphological traits. Specimens were then identified to species level using regional floristic keys and botanical references (Quézel and Santa 1962–1963; Ozenda 2004; Deghiche-Diab and Deghiche 2016). Species were classified according to their botanical families.

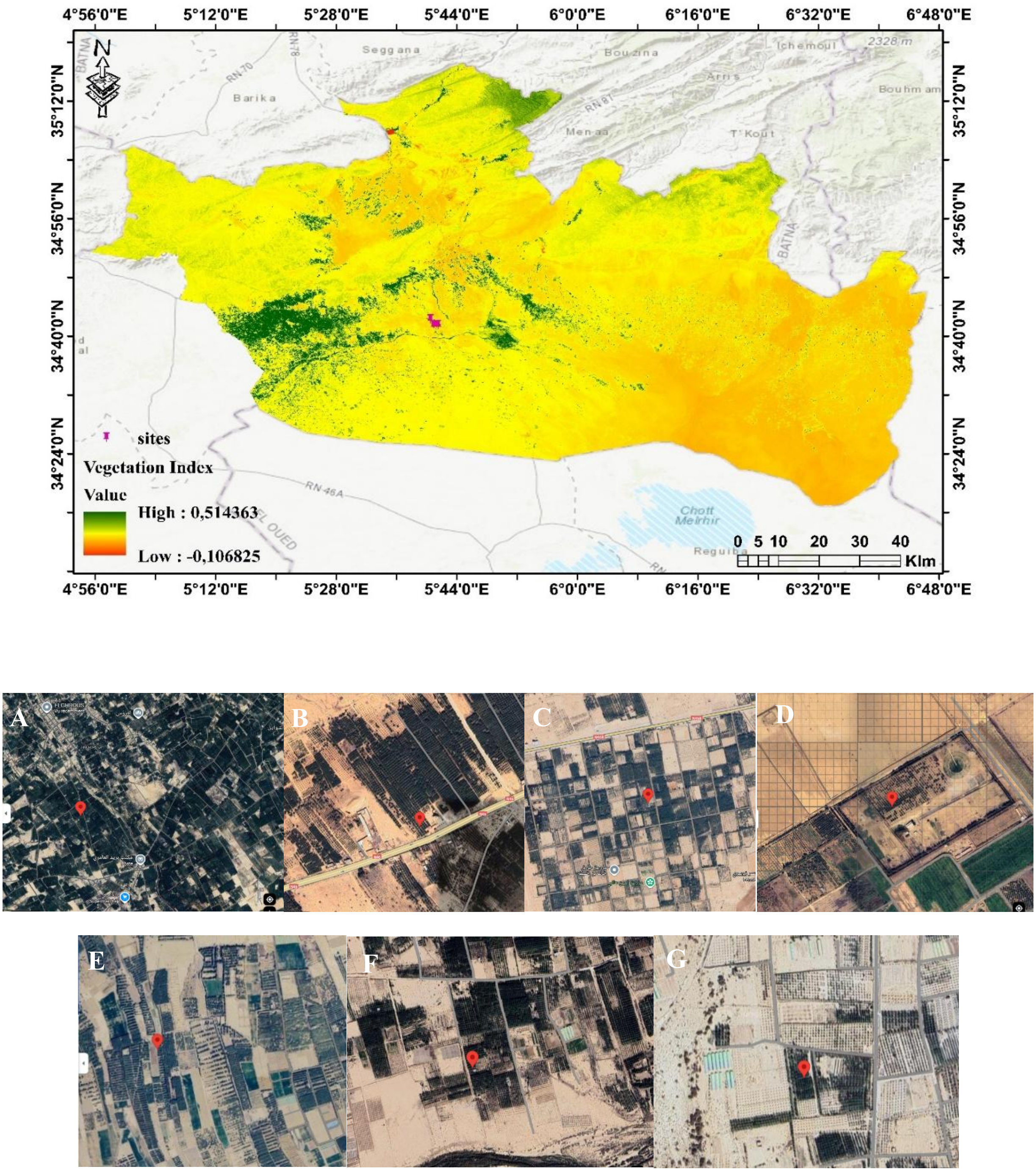

Figure 1. Sampling area (up) and locations (A–G) of the seven surveyed palm groves – **A.** El Hadjeb. **B.** El Ghrous. **C.** M'lili. **D.** El Outaya. **E.** Sidi Okba. **F.** M'khedma. **G.** Bouchagroun.

Mite sampling and detection

For each recorded plant species, leaves, stems, and young shoots were randomly collected during each sampling period and transported to the laboratory in labeled paper bags. Plant material was examined under a stereomicroscope (20–40× magnification) to detect the presence of *Oligonychus* mites.

Detected mites were carefully removed using a fine hairbrush, preserved in 70% ethanol, and stored for further identification.

Mite identification

Mite specimens were mounted on microscope slides using Hoyer's medium and examined under a compound microscope at 400× magnification. Identification of *O. afrasiaticus* was based on diagnostic morphological characters, including dorsal setae arrangement, leg chaetotaxy, and aedeagus morphology, following the identification keys of Bolland *et al.* (1998) and Migeon *et al.* (2011).

Data analysis

For each weed species and sampling site, the presence or absence of *O. afrasiaticus* was recorded during each sampling period. A binary presence/absence matrix was constructed to assess host associations across plant species, seasons, and palm groves. This approach was adopted because sampling focused on host utilization rather than population density and because mite abundance on weeds was generally low and spatially heterogeneous.

Descriptive statistics were used to summarize weed species richness, infestation frequency and temporal patterns of occurrence. Network-type visualizations implemented in R (R Core Team 2024) were then applied to explore spatial and temporal structure in host use. A chord diagram was used to depict associations between palm groves and infested weed species, a second chord diagram to represent family-level and weekly patterns of infestation (R1–R18), and a Sankey diagram to illustrate the flow of mite occurrences from plant families to species, months and weekly sampling repetitions, thereby highlighting the main host taxa, sites and periods contributing to the connectivity and spread of *O. afrasiaticus* within the oasis agroecosystem.

RESULTS

Spatial distribution of Oligonychus afrasiaticus

Surveys conducted in 2021 across seven palm groves revealed the presence of *Oligonychus afrasiaticus* in all investigated sites (Fig. 1). However, infestation patterns differed spatially among groves. The number of plant species on which the mite was detected varied between locations, indicating heterogeneous host utilization across the Ziban region.

Chord diagram analysis illustrated site-specific differences in infestation patterns (Fig. 2). El Outaya and El Hadjeb exhibited the highest number of infested plant species, followed by El Ghrous, whereas Sidi Okba showed the lowest number of affected species. These spatial patterns indicate unequal distribution of host associations among palm groves.

Seasonal dynamics of infestation

The occurrence of *O. afrasiaticus* followed a clear seasonal pattern from March to July 2021 (Fig. 3). Initial detections were recorded in early spring (March-April), primarily on herbaceous weed species. The number of infested plant species increased markedly in April and May, reaching a peak during mid-spring. The number of weeds plant species infested by the date palm mite (*Oligonychus afrasiaticus*) shows clear seasonal variation. From April onwards, a marked increase is observed, with the number of infested species ranging between 14 and 49, reflecting the progressive establishment of the pest and the improvement of environmental conditions. The highest infestation level is recorded in May, where the number of affected species reaches a peak (up to 53 species), suggesting optimal conditions for mite development and a high availability of suitable adventive hosts. In June, infestation remains relatively high but slightly decreases, while in July a noticeable decline is observed. Overall, the results indicate that boufaroua infestation peaks in spring and gradually decreases during the hot summer period. Thereafter, infestation increases again in late June and July, likely due to a transition toward more drought-adapted weed species and greater pressure on date palm.

The occurrence of *O. afrasiaticus* followed a clear seasonal pattern from March to July 2021 (Fig. 3). Initial detections were recorded in early spring (March–April), primarily on herbaceous weed species, including *Cynodon dactylon*, *Daucus carota*, and *Aster squamatus*. During this period, infestation was recorded on 14 plant species. The number of infested plant species increased markedly in April and May, ranging between 14 and 49 species, reflecting the progressive establishment of the pest on a broader range of host plants. Among the most frequently infested species during this expansion phase were *Kochia scoparia* and *Salsola tetragona*, which were consistently associated with mite presence across several sites. The infestation reached its peak in May, with a total of 53 plant species recorded as hosts, indicating optimal environmental conditions for mite development and high availability of suitable alternative hosts. In June, infestation remained relatively high but showed a slight decline, likely due to the senescence of several spring weeds, while a further decrease was observed in July. Overall, infestation peaked in spring and gradually declined during the hot summer period, with a secondary increase associated with drought-adapted weed species and increasing pressure on date palms.

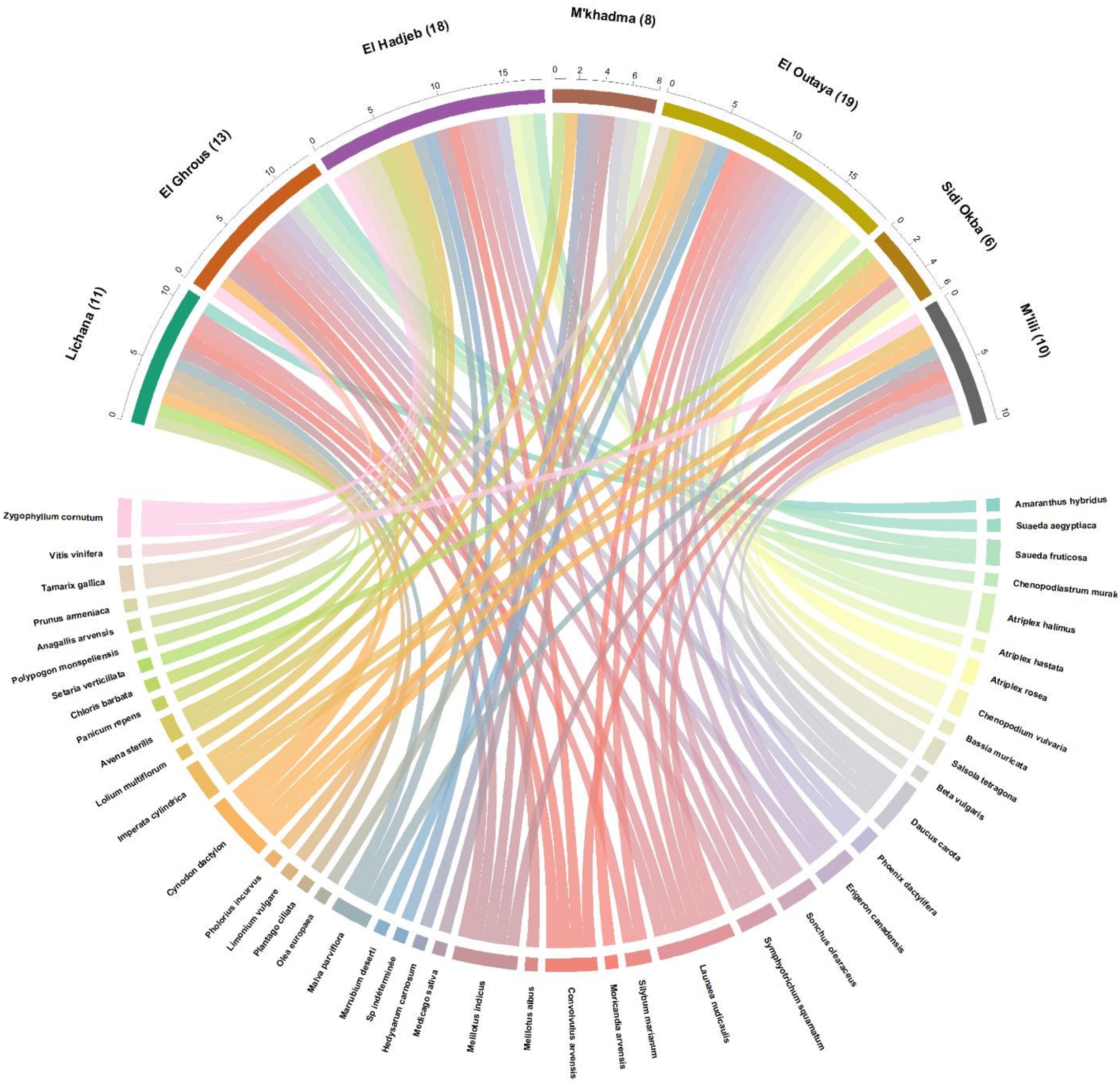

Figure 2. "Chord diagram showing the occurrence of Boufaroua on weed host species across sampled palm groves." Each arc on the upper part of the circle represents one palm grove, with the number in parentheses indicating the number of infested weed species recorded at that site. Chords link each weed species to the grove or groves where Boufaroua was detected on it, highlighting the spatial distribution and relative importance of weed hosts in maintaining mite populations within the Ziban oases. Chord diagram analysis showing the importance occurrence of Boufaroua on weeds plant species by sampling Site.

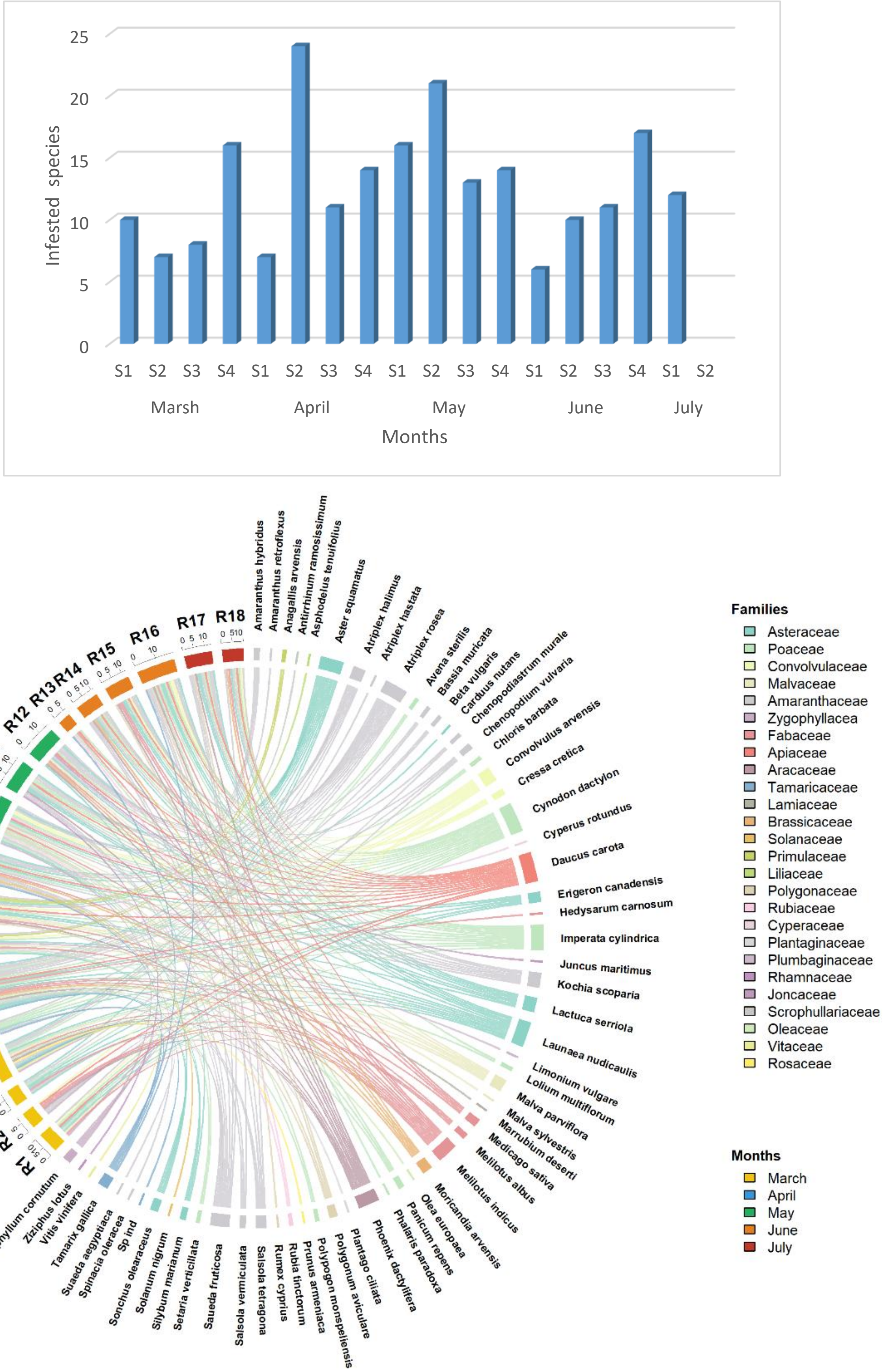

Figure 3. Seasonal importance of boufaroua (O. afrasiaticus) infestation: **A.** distribution across periods of appearance; **B.** Chord diagram showing the distribution of Boufaroua-infested weed species among weekly sampling repetitions. Weed species are arranged along the right side of the circle, grouped and colored by botanical family, whereas R1–R18 on the left represent consecutive weekly sampling repetitions over the study months. Colored chords connect species to the weeks when they were infested, highlighting which families and weed species sustained mite populations over time and during peaks of infestation intensity.

Weed species and host associations

A total of 76 plant species belonging to 28 botanical families were recorded during the survey period. Among these, *O. afrasiaticus* was detected on 44 plant species. Five weed species *Cynodon dactylon* (Poaceae), *Daucus carota* (Apiaceae), *Aster squamatus* (Asteraceae), *Kochia scoparia* and *Salsola tetragona* (Amaranthaceae) were consistently infested across multiple sites and sampling periods and were therefore identified as alternative hosts capable of sustaining mite populations (Fig. 4, Table1).

The most represented plant families among infested species were Amaranthaceae, Poaceae, and Asteraceae, reflecting their predominance in the understory vegetation of the surveyed palm groves.

Table 1. Floristic composition and biological types of collected and identified plant species under Biskra palm groves.

Family	Species	Code	Biological type
Asteraceae	*Erigeron canadensis* L.	Erigca	Annual
	Dittrichia viscosa (L.)	Ditvi	Perennial
	Sonchus arvensis L.	Sonar	Perennial
	Sonchus olearaceus L., 1753	Sonol	Annual
	Symphyotrichum squamatum (Spreng.)	Symsq	Annual
	Launaea nudicaulis L.	Launu	Annual
	Lactuca serriola L.	Lacse	Biennial
	Carduus nutans L.	Carnu	Biennial
	Silybum marianum (L.)	Silma	Biennial
Poaceae	*Pholurius incurvus filiformis* (Roth)	Phoin	Perennial
	Cynodon dactylon L.	Cynda	Perennial
	Imperata cylindrica L.	Impcy	Perennial
	Lolium multiflorum Lam	Lolmu	Annual
	Avena sterilis L.	Avest	Annual
	Panicum repens L.	Panre	Perennial
	Poaceae (not identified)	Poain	Annual
	Setaria verticillata L.	Setve	Annual
	Chloris barbata Sw.	Chlba	Perennial
	Phalaris paradoxa L.	Phapa	Annual
	Polypogon monspeliensis L.	Polmo	Annual
Convolvulaceae	*Cressa cretica* L.	Crecr	Perennial
	Convolvulus arvensis L.	Conar	Perennial
Malvaceae	*Malva sylvestris* L.	Malsy	Perennial
	Malva parviflora L.	Malpa	Annual
Amaranthaceae	*Amaranthus retroflexus* L.	Amare	Annual
	Amaranthus hybridus L.	Amahy	Annual
	Suaeda aegyptiaca (Hasselq.)	Suaae	Annual
	*Suaeda fruticosa*Forssk. & J. F. Gmel.	Saufr	Perennial
	Chenopodiastrum murale (L.)	Chemu	Annual
	Atriplex halimus L.	Atrhal	Perennial
	Atriplex prostrata Boucher & DC. 1805	Atrhas	Annual
	Atriplex rosea L.	Atrro	Perennial
	Chenopodium vulvaria L.	Chevu	Annual
	Bassia muricata L.	Basmu	Perennial
	Salsola tetragona Delile	Salte	Perennial
	Salsola vermiculata L.	Salve	Perennial
	Spinacia oleracea L.	Spiol	Annual
	Beta vulgaris L.	Betvul	Annual
	Bassia scoparia (L.)	Kocsc	Annual
Zygophyllaceae	*Zygophyllum cornutum* Coss	Zygco	Perennial
Fabaceae	*Melilotus albus* Medik.	Melal	Annual
	Melilotus indicus L.	Melin	Annual
	Medicago sativa L.	Medsa	Perennial
	Fabaceae (not identified)	Fabin	Perennial
	Hedysarum carnosum Desf.	Hedca	Perennial
Apiaceae	*Daucus carota* L.	Dauca	Biennial
Tamaricaceae	*Tamarix gallica* L.	Tamga	Perennial
	Tamarix sp.	Tamin	Perennial
Lamiaceae	*Marrubium deserti* De Noe	Marde	Perennial
Brassicaceae	*Moricandia arvensis* L.	Morar	Annual

Table 1. Continued.

Family	Species	Code	Biological type
Solanaceae	*Solanum nigrum* L.	Solni	Annual
Primulaceae	*Anagallis arvensis* L.	Annar	Annual
Liliaceae	*Asphodelus tenuifolius* Cav.	Aspte	Annual
Polygonaceae	*Rumex cyprius* Murb	Rumcy	Perennial
	Polygonum aviculare L.	Polav	Annual
Rubiaceae	*Rubia tinctorum* L.	Rubti	Perennial
Cyperaceae	*Cyperus rotundus* L.	Cypro	Perennial
Plantaginaceae	*Plantago ciliata* Desf.	Placi	Annual
Plumbaginaceae	*Limonium vulgare* Mill.	Limvu	Perennial
Rhamnaceae	*Ziziphus lotus* L.	Zizlo	Perennial
Joncaceae	*Juncus maritimus* Lam.	Junma	Perennial
Scrophullariaceae	*Antirrhinum ramosissimum* Coss. & Durieu	Antra	Perennial
Oleaceae	*Olea europaea* L.	Oleeu	Perennial
Vitaceae	*Vitis vinifera* L.	Vitvi	Perennial
Rosaceae	*Prunus armeniaca* L.	Pruar	Perennial
Aracaceae	*Phoenix dactylifera* L.	Phoda	Perennial

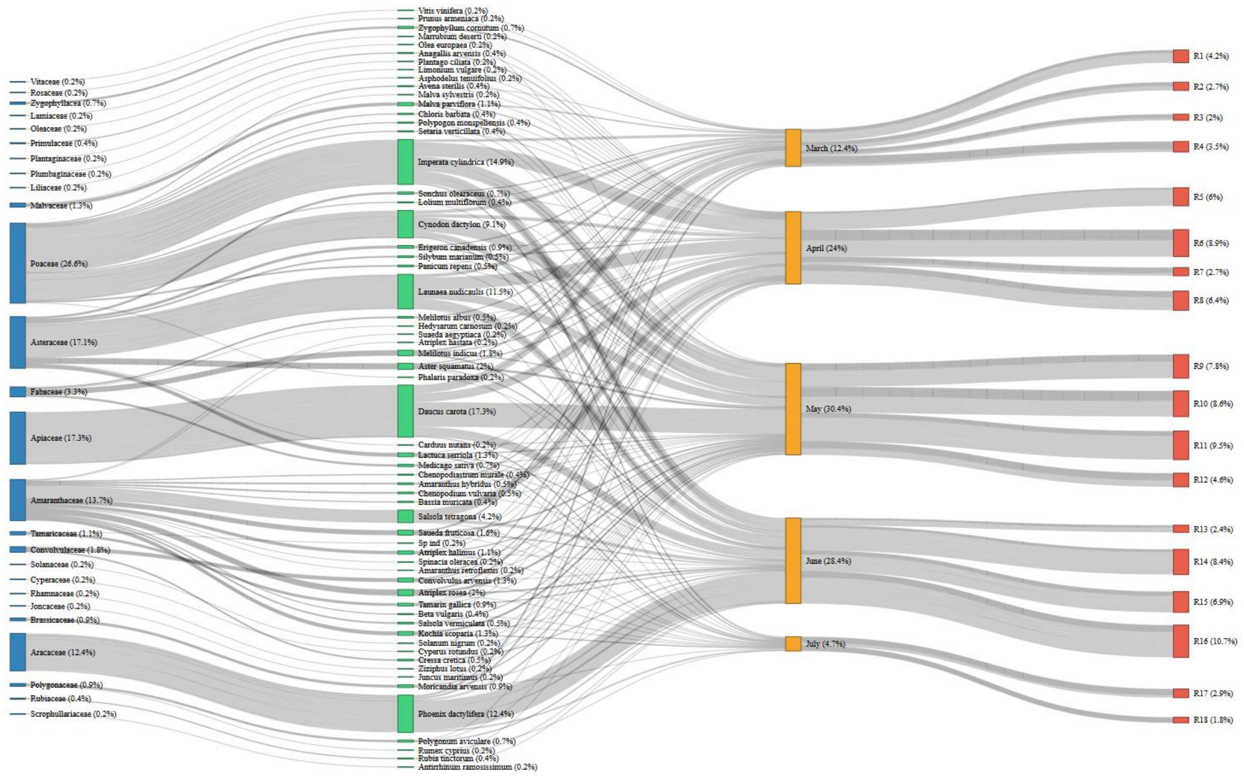

Figure 4. Sankey diagram of Boufaroua occurrences by plant family, weed host species, month and weekly sampling repetition. Nodes are grouped from left to right into plant families, weed species, months and weekly samples (R1–R18), with node width proportional to the number and percentage of observations of Boufaroua in each category. Flows link families to the weed species on which the mite was recorded, then to the months and weekly sampling repetitions during which infestations were detected, highlighting the main taxonomic and temporal contributors to mite abundance.

DISCUSSION

The present study provides new insights into the ecological role of weed flora in shaping the population dynamics of *O. afrasiaticus* within oasis agroecosystems of the Ziban region. Although the mite was detected in all surveyed palm groves, spatial variation in infestation patterns was evident, suggesting that local environmental conditions and vegetation structure strongly influence host utilization. Differences among sites likely reflect variations in microclimate, grove management practices, and weed community composition, factors that have been previously identified as key drivers of arthropod pest distribution in arid agroecosystems (Didham *et al.* 2007; Deghiche-Diab *et al.* 2020). The ecological role of non-crop vegetation in sustaining populations of *O. afrasiaticus* is increasingly recognized as a key driver of infestation dynamics in date palm agroecosystems. In Algerian oases, spontaneous flora associated with palm groves particularly in regions such as Lichana and M'khadma comprises a diverse assemblage of herbaceous, sub-shrub, and shrub species that can serve as alternative hosts for this phytophagous mite.

Seasonal dynamics observed in this study highlight a clear temporal structuring of *O. afrasiaticus* infestations. Early-season establishment on herbaceous weeds during spring was followed by a progressive shift toward date palms as temperatures increased and early weeds senesced. This pattern is consistent with previous reports indicating that *O. afrasiaticus* thrives under high temperatures and low relative humidity and exploits alternative hosts when primary hosts are temporarily unsuitable (Dhouibi and Chermiti 1992; El-Shafie 2022). The synchronization between mite occurrence and plant phenology underscores the adaptive flexibility of this species in oasis environments.

A key finding of this study is the identification of specific weed species that function as alternative or secondary hosts for *O. afrasiaticus*. Among the 44 infested plant species recorded, *Cynodon dactylon*, *Daucus carota*, *Aster squamatus*, *Kochia scoparia*, and *Salsola tetragona* were consistently associated with mite presence across multiple sites and sampling periods. These species likely provide suitable microhabitats and nutritional resources that enable mite survival during early spring or between phenological stages of date palms. Similar host associations have been reported for other tetranychid mites, where weeds serve as reservoirs facilitating rapid recolonization of cultivated crops (Zaher *et al.* 1982; Ben Chaabane *et al.* 2011; El-Shafie 2022).

Species commonly recorded in arid environments were identified as reservoirs, including *Salsola tetragona* (Amaranthaceae), *Cynodon dactylon* (Poaceae). These taxa differ markedly in their phenological patterns and structural characteristics, which in turn influence their suitability for mite colonization. Herbaceous annuals such as *Kochia scoparia* emerge early in spring and provide transient feeding sites, often associated with moderate mite densities due to their short life cycle. In contrast, perennial sub-shrubs and shrubs like *Salsola vermiculata* and *Cynodon dactylon* maintain vegetative activity over longer periods and offer more stable microhabitats, supporting higher densities and prolonged persistence of mite populations.

Field sampling across multiple sites revealed that mite abundance varied significantly with plant life form and phenological stage. Higher numbers of individuals were consistently recorded on perennial hosts during late spring, suggesting that these species act as key bridging reservoirs between seasons. This pattern is consistent with findings reported in other arid agroecosystems, where non-crop vegetation plays a crucial role in maintaining phytophagous mite populations during periods when the main crop is unsuitable (Integrated Pest Management framework). McMurtry *et al.* (2013) emphasized the importance of alternate host plants in the persistence of tetranychid mites, while Bolland *et al.* (1998) documented the broad host range and ecological plasticity of spider mites across diverse plant taxa. Similarly, studies conducted in North African and Middle Eastern date palm systems have highlighted the role of surrounding vegetation and alternative hosts (including grasses and ground cover) in facilitating early-season infestations and maintaining mite populations during off-fruit periods (Alatawi 2020; Ben Chaaban *et al.* 2011; Mirza *et al.* 2021).

Moreover, vegetation structure at the site level appears to modulate infestation pressure. Sites characterized by dense and taxonomically diverse weed communities particularly those dominated by perennial Chenopodiaceae and Asteraceae harbored greater mite populations compared to sparsely vegetated areas. This supports the hypothesis that habitat complexity enhances resource continuity and microclimatic buffering, both of which are favorable to mite survival and reproduction.

The ecological role of weed hosts has important implications for the management of *O. afrasiaticus*. Conventional control strategies in date palm orchards often focus exclusively on the crop itself, overlooking the contribution of surrounding vegetation to pest persistence. Our results suggest that targeted management of key weed species during early spring could reduce the availability of reservoir hosts and delay or limit subsequent infestations of date palms. Such approaches align with ecologically based integrated pest management (IPM) principles, which emphasize habitat manipulation and preventive measures over reactive chemical control. Incorporating weed surveillance and selective weed management into IPM programs may therefore enhance the sustainability and effectiveness of control strategies against *O. afrasiaticus* in oasis agroecosystems.

Importantly, weed management should not be approached through indiscriminate removal, as this may lead to unintended ecological consequences such as soil degradation, loss of beneficial arthropods, and rapid recolonization by equally or more suitable host species. Instead, selective weed management strategies should be implemented, focusing specifically on high-risk reservoir species while maintaining less favorable or neutral vegetation that may contribute to overall agroecosystem stability. This nuanced approach aligns with core IPM principles, which emphasize habitat manipulation, ecological balance, and reduction of pesticide dependence (Altieri and Nicholls 2004).

Furthermore, integrating phenological tracking of both weed species and mite populations could significantly improve decision-making. By aligning control measures with key biological windows such as peak mite reproduction on reservoir hosts managers can optimize intervention timing and efficacy. Complementary strategies, including the conservation or augmentation of natural enemies, could also be explored to enhance biological regulation within these systems.

CONCLUSION

This study demonstrates that the yellow date palm mite, *O. afrasiaticus* (Boufaroua), persists within the Ziban oasis agroecosystems not only through its primary host, *Phoenix dactylifera*, but also through a network of alternative weed hosts. The consistent association of the mite with specific weed species confirms that spontaneous vegetation plays an active ecological role in sustaining mite populations and shaping seasonal infestation patterns in date palm groves.

Our findings indicate that the early-season presence of *O. afrasiaticus* on herbaceous weeds during spring facilitates population persistence and precedes subsequent infestations of date palms under hot and dry summer conditions. This seasonal host shift highlights the importance of plant phenology and understory vegetation composition in the population ecology of the mite and provides a mechanistic explanation for recurrent outbreaks observed in oasis environments.

From an applied perspective, these results emphasize that effective management of *O. afrasiaticus* cannot rely solely on crop-focused interventions. Integrated pest management strategies should incorporate preventive, habitat-based approaches, including: (1) early-season monitoring of key weed species identified as alternative hosts; (2) selective and timely weed management during spring to reduce reservoir hosts before population buildup; and (3) integration of weed surveillance with climatic monitoring to anticipate periods of high infestation risk.

By integrating ecological knowledge of host use into IPM programs, more sustainable and effective control strategies can be developed to protect date palm production in arid oasis agroecosystems. Overall, incorporating weed surveillance, functional classification of host plants (herbaceous, perennial, ...), and selective vegetation management into IPM programs represents a promising pathway toward more sustainable control of *O. afrasiaticus*. Such an approach acknowledges the agroecosystem as an integrated whole, where managing the interactions between crops, weeds, pests, and the environment is essential for long-term resilience and productivity in Algerian oasis systems.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the Directorate General for Scientific Research and Technological Development (DGRSDt) and the Ministry of Higher Education and Scientific Research (MESRS) for their institutional support.

Author contributions: Sampling and collection: M.M., R.A., R.M., B.N.; Preparation of specimens: O.B., Z.R.; Analyses and data curation: A.S.; D.D.N.; Illustration and photography: O.T.A.; D.D.N.; writing – original draft preparation: D.D.N; writing – revisions and editing: H.B; D.D.N.; supervision: H.B; D.D.N. All authors have read and agreed to the published version of the manuscript.

Funding: Not Applicable

Availability of data and materials: Data are available upon request from the authors.

Ethics approval and consent to participate: This study only included arthropod material, and all required ethical guidelines for the treatment and use of animals were strictly adhered to in accordance with international, national, and institutional regulations. No human participants were involved in any studies conducted by the authors for this article.

Consent for publication: NA.

Competing interests: The authors declare no conflict of interest.

Generative AI statement: The authors declare no use of Gen AI in the creation of this manuscript.

REFERENCES

Alatawi, F. J. (2020) Field studies on occurrence, alternate hosts and mortality factors of date palm mite, *Oligonychus afrasiaticus* (Acari: Tetranychidae). *Journal of the Saudi Society of Agricultural Sciences*, 19(2): 146–150. https://doi.org/10.1016/j.jssas.2018.08.003

Altieri, M. & Nicholls, C. (2004) *Biodiversity and Pest Management in Agroecosystems*. 2nd ed. CRC Press. 252 pp. https://doi.org/10.1201/9781482277937

Ben Chaabane, S., Chermiti, B. & Kreiter, S. (2011) Seasonal occurrence of *Oligonychus afrasiaticus* and phytoseiid predators on date palm *Phoenix dactylifera* (Deglet Noor cultivar) in Tunisian oases. *Bulletin of Insectology*, 64(1): 15–21.

Ben Chaabane, S., Chermiti, B. & Kreiter, S. (2012) Effects of host plants on distribution, abundance, developmental time and life table parameters of *Oligonychus afrasiaticus* (McGregor) (Acari: Tetranychidae). *Papéis Avulsos de Zoologia*, 52(10): 121–132 .

Bolland, H.R., Gutierrez, J. & Flechtmann, C.H.W. (1998) *World catalogue of the spider mite family (Acari: Tetranychidae)*. Brill Academic Publishers, Leiden, Boston, Köln, 392 pp.

Bouguedoura, N., Bennaceur, M., Babahani, S. & Benziouche, S.E. (2015) Date palm status and perspectives in Algeria. *In:* Al-Khayri, J., Jain, S. & Johnson, D. (Eds.), *Date Palm Genetic Resources and Utilization*, *Vol. 1: Africa and the Americas*. Springer, Dordrecht. https://doi.org/10.1007/978-94-017-9694-1_4

Deghiche-Diab, N. (2019) *Flore adventice des oasis des Ziban, Biskra, Algérie*. INRA Algérie, 150 pp.

Deghiche-Diab, N. & Deghiche, L. (2016) *Flore spontanée des oasis des Ziban, Biskra, Algérie*. Éditions Universitaires Européennes, 300 pp.

Deghiche-Diab, N. & Deghiche, T. (2022a) New records and checklist of arthropods from two oasis ecosystems in Algeria. *Studia Universitatis Babeş-Bolyai, Biologia*, 67(1): 89–105.

Deghiche-Diab, N. & Deghiche, T. (2022b) Effect of climate change on the evolution of phenological stages of date palm (*Phoenix dactylifera* L.) in Ziban Oasis, Biskra, Algeria. *Journal of Basic and Applied Research International*, 27(10): 32–41.

Deghiche-Diab, N., Benouamen, O., Zguerou, R., Roumani, M., Mehenni, M. & Rekis, A. (2025) Weed flora and infestation dynamics of the yellow date palm mite *Oligonychus afrasiaticus* in Biskra, Algerian oases. *Arab Journal of Plant Protection*, 43(Special Issue): E-19.

Deghiche-Diab, N., Deghiche, L. & Belhamra, M. (2020) Study of spontaneous plants and their associated arthropods in Ziban oases agroecosystem, Biskra, Algeria. *IOBC-WPRS Bulletin*, 151: 127–134.

Deghiche-Diab, N., Porcelli, F. & Belhamra, M. (2015) Entomofauna of Ziban Oasis, Biskra, Algeria. *Journal of Insect Science*, 15(41): 1–7.

Dhouibi, M.H. & Chermiti, B. (1992) Biologie et écologie du Boufaroua du palmier dattier (*Oligonychus* *afrasiaticus*). *Revue d'Aridologie*, 4: 33–42.

Didham, R.K., Tylianakis, J.M., Gemmell, N.J., Rand, T.A. & Ewers, R.M. (2007) Interactive effects of habitat modification and species invasion on native species decline. *Trends in Ecology and Evolution*, 22(9): 489–496. https://doi.org/10.1016/j.tree.2007.07.001

Elhoumaizi, M.A., Saaidi, M., Oihabi, M. & Cilas, C. (2002) Phenotypic diversity of date-palm cultivars (*Phoenix dactylifera* L.) from Morocco. *Genetic Resources and Crop Evolution*, 49: 483–490. https://doi.org/10.1023/A:1020968513494

El-Shafie, H.A. (2022) The Old World date palm mite *Oligonychus afrasiaticus* (McGregor 1939) (Acari: Tetranychidae), a major fruit pest: biology, ecology, and management. *CABI Reviews*. https://doi.org/10.1079/cabireviews202217020

FAO (2023) *FAOSTAT Agriculture Database*. Food and Agriculture Organization of the United Nations. Available from: https://www.fao.org/faostat/en (Accessed on 20 November 2025).

Faurie, C., Ferra, C., Médori, P., Dévaux, J. & Hemptinne, J.-L. (2003) *Écologie: approche scientifique pratique*. 5th ed. Cachan, Lavoisier-Tec & Doc, 407 pp.

Gounot, M. (1969) *Méthodes d'étude quantitative de la végétation*. Masson, Paris, 314 pp.

Howard, F.H. (2001) Insect pests of palms and their control. *Pesticide Outlook*, 12: 240–243.

McMurtry, J.A., Moraes, G.J. de & Sourassou, N.F. (2013) Revision of the lifestyles of phytoseiid mites (Acari: Phytoseiidae) and implications for biological control strategies. *Systematic and Applied Acarology*, 18(4): 297–320. https://doi.org/10.11158/saa.18.4.1

Mirza, J.H., Kamran, M. & Alatawi, F.J. (2021) Phenology and abundance of date palm mite *Oligonychus afrasiaticus* in relation to host habitats and environmental factors. *Saudi Journal of Biological Sciences*, 28(8): 4348–4357. https://doi.org/10.1016/j.sjbs.2021.04.023

Migeon, A., Nouguier, E. & Dorkeld, F. (2011) Spider Mites Web: a comprehensive database for the Tetranychidae. *Trends in Acarology*, pp. 557–560.

Ozenda, P. (2004) *Flore du Sahara*. 3rd ed. CNRS Éditions, 662 pp.

Quézel, P. & Santa, S. (1962–1963) *Nouvelle flore de l'Algérie et des régions désertiques méridionales*. Vols. 1–2. CNRS. 1170 pp.

R Core Team (2024). A Language and Environment for Statistical Computing. *R Foundation for Statistical Computing*. https://www.R-project.org/

Sánchez-Bayo, F. & Wyckhuys, K. (2019) Worldwide decline of insects: drivers and trends. *Biological Conservation*, 232: 8–27.

Van den Berg, H., Hamdy, A. & Al-Deeb, M.A. (2008) Date palm pests and their management. *Agricultural Research Communications*, 28(3): 231–238.

Zaher, M.A., Gomaa, E.A. & El-Enany, M.A. (1982) Spider mites of Egypt (Acari: Tetranychidae). *International Journal of Acarology*, 8: 91–114.

گیاهان هرز به عنوان منابع آلودگی دیگر هِرِنای تارتن خرما، *Oligonychus afrasiaticus* (Acari: Tetranychidae) در واحه زیبان، الجزایر

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دریافت
۷ دی ۱۴۰۴

پذیرش
۱۰ خرداد ۱۴۰۵

انتشار
۲۴ تیر ۱۴۰۵

دبیر تخصصی
آ. فرازمند

چکیده

هرنای تارتن خرما، *Oligonychus afrasiaticus* (McGregor) که در شمال آفریقا با نام «بوفاروآ» شناخته می‌شود، یکی از مخرب‌ترین آفات تولید خرما در منطقۀ زیبان در جنوب‌شرقی الجزایر به شمار می‌رود. با وجود اهمیت اقتصادی این آفت، اطلاعات محدودی درباره نقش بوم‌شناختی گیاگان علف‌های هرز خودرو در حفظ جمعیت کنه و تسهیل آلودگی فصلی نخل‌های خرما در دسترس است. ازاین‌رو، پژوهش حاضر با هدف شناسایی گونه‌های علف‌های هرزی که می‌توانند به‌عنوان میزبان‌های دیگر *O. afrasiaticus* عمل کنند، تعیین نقش آن‌ها در تداوم فصلی جمعیت آفت، و ارزیابی تأثیر فنولوژی فصلی گیاهان و تغییرات مکانی بین نخلستان‌ها بر پویایی آلودگی انجام شد. برای این منظور، ررسی میدانی شش‌ماهه از فوریه تا ژوئیه ۲۰۲۱ در هفت نخلستان منتخب و نماینده از واحه‌های منطقۀ زیبان انجام گرفت. حضور و فراوانی *O. afrasiaticus* بر روی نخل‌های خرما و گونه‌های علف‌های هرز همراه، در ارتباط با تغییرات فصلی و تفاوت‌های مکانی بین مکان‌ها مورد پایش قرار گرفت. نتایج نشان داد که این هرنا در تمامی نخلستان‌های بررسی‌شده حضور دارد، اما شدت آلودگی آن بسته به شرایط ریزاقلیمی و شیوه‌های مدیریت نخلستان متفاوت است. در میان ارقام خرما، رقم «دگلت نور» بیشترین حساسیت را به آلودگی نشان داد. در مجموع، ۷۶ گونه علف هرز شناسایی شد که از میان آن‌ها پنج گونه شامل *Cynodon dactylon*، *Daucus carota*، *Aster squamatus*، *Kochia scoparia* و *Salsola tetragona* به‌عنوان میزبان‌های جایگزین تأیید شدند و توانایی حفظ و تداوم جمعیت هرنا را داشتند. الگوی آلودگی روند فصلی مشخصی را نشان داد؛ به‌طوری‌که استقرار اولیه هرنا در فصل بهار بر روی علف‌های هرز علفی صورت گرفته و سپس با حاکم شدن شرایط گرم و خشک تابستان، جمعیت آن به سمت نخل‌های خرما منتقل شده است. یافته‌های این پژوهش نشان می‌دهد که جوامع علف‌های هرز نقش اکولوژیک مهمی در زنده‌مانی، پایداری و گسترش *O. afrasiaticus* در اکوسیستم‌های زراعی واحه‌ای دارند و بر ضرورت تلفیق مدیریت هدفمند علف‌های هرز در برنامه‌های مدیریت تلفیقی آفات (IPM) به‌منظور حفاظت پایدار از نخل‌های خرما تأکید می‌کنند.

واژگان کلیدی: میزبان‌های دیگر، بوفاروآ ، نخل خرما، مدیریت تلفیقی آفات، اکوسیستم‌های کشاورزی واحه‌ای، گیاگان علف‌های هرز

CITE: Deghiche-Diab, N., Benouamane, O., Ouamane, A.T., Zguerou, R., Abbas, S., Roumani, M., Mehenni, M., Rekis, A., Nia, B. & Bozdoğan, H. (2026) Weed plants as sources of infestation Weed plants as sources of infestation for the date palm mite *Oligonychus afrasiaticus* (Acari: Tetranychidae) in the Ziban oasis, Algeria.. *Persian Journal of Acarology*, 15(3): 150306.
https://doi.org/10.22073/pja.150306