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# Responses of soil-inhabiting mesostigmatid mites to deforestation and disturbance in oak (*Quercus brontii*) forests of southwestern Iran

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**Electronic Supplementary Material (ESM)**

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Four diversity indices were calculated to assess the changes of deforestation on mesostigmatid mite population:

**(1) Diversity index:** A diversity index is a quantitative measure that reflects to the number of different species and how evenly the individuals are distributed among those species. At each sampling date, the diversity index (also named as Shannon and Wiener index) *H'* was calculated using the method described by Shannon and Wiener. It is broadly used in ecological studies and calculated as:

$$H' = -\sum_{i=1}^{R} p_i \times \ln\left(p_i\right) \quad \text{(S1)}$$

where:

$p_i$ –relative abundance of species I;

$R$ – number of species in the sample.

**(2) Simpson index:** Another index is the Simpson index of diversity (Simpson 1949) which is used to determine the dominance of species and gives the probability of each two individuals that selected randomly and drawn from a large and infinite community in a region, belong to different species. The Simpson index of diversity ranges between 0 and 1. For a finite community, the following equation is usually used:

$$1 - D = 1 - \sum_{i=1}^{R}\left[\frac{n \times \left(n-1\right)}{N \times \left(N-1\right)}\right] \quad \text{(S2)}$$

where:

$n$ – number of each species in the sample;

$N$ – total number of collected mites in the sample;

$R$ – number of species in the sample.

**(3) Jaccard's index:** The degree of similarity in species composition between the natural and manipulated forest was compared using the Jaccard's index (Jaccard 1901):

$$Sj = \frac{a}{a+b+c} \quad \text{(S3)}$$

where:

$a$ – number of species common between both microhabitats (natural forest and disturbed forest);

$b$ – number of species present only in the first site and absent from the other site;

$c$ – number of species present only in the second site and absent from the first one.

**(4) Species richness index:** The Species richness index (also named as Margalef index) was calculated according to the following equation (Magurran 1998):

$$SR = \frac{S-1}{\ln(N)} \quad \text{(S4)}$$

where:

$S$ – total number of species;

$N$ – total number of individuals in the sample.

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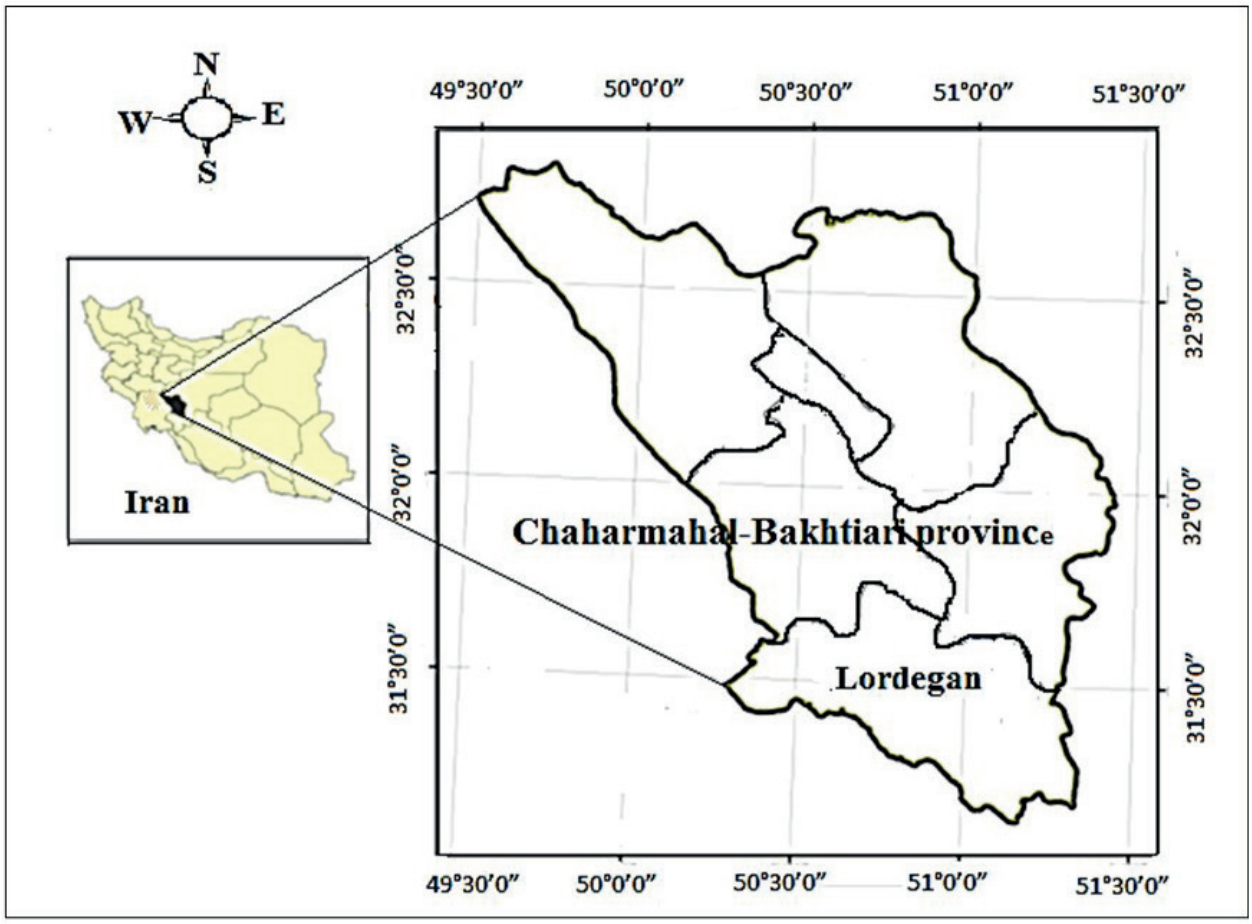


Figure S1. Map of study region, Lordegan, Chaharmahal-Bakhtiari province, Iran

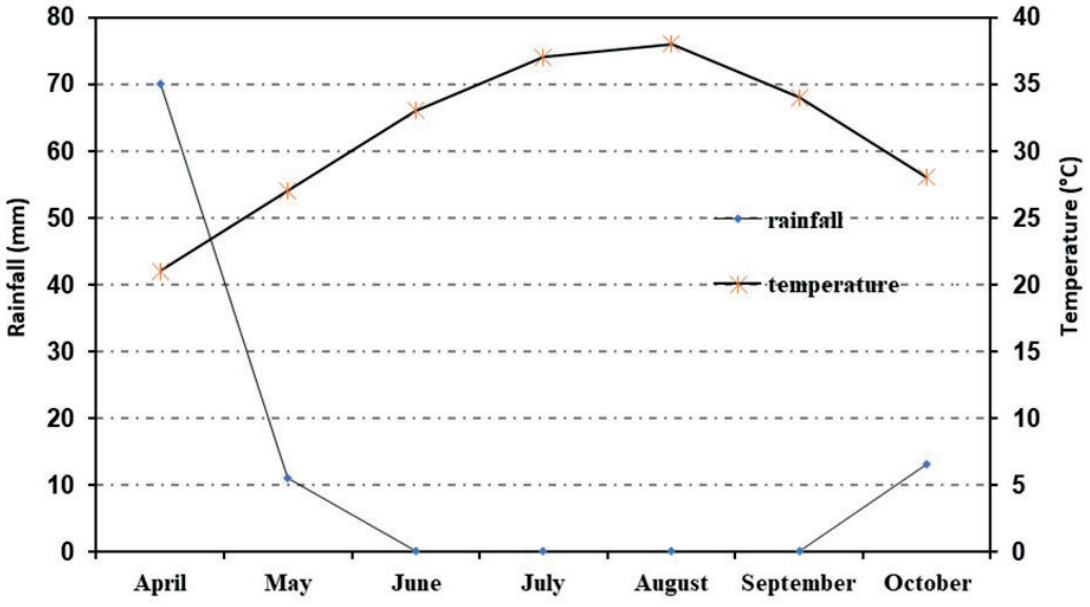


Figure S2. Mean monthly rainfall and temperature in the study area during the experimental period

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Table S1. Habitat and food preferences of collected mesostigmatid mite families (Lindquist et al. 2009)

| Family | Preferred habitat and food |
|---|---|
| *Laelapidae* | free living or associated with arthropods, mammals or birds |
| *Macrochelidae* | predaceous on nematods and the eggs and larvae of other microinvertebrates occurring in organic substrates |
| *Ologamasidae* | predaceous in soil, humus and compost |
| *Ascidae* | predaceous on nematods, micro-arthropods and sciarid fly eggs. They are unspecialized free living inhabitants of soil and arboreally suspended litter and humus layers |
| *Veigaiidae* | predaceous in organic humus and litter habitats |
| *Pachylaelapidae* | predaceous on microfauna in litter, humus, moss and the nests of mammals and social insects |
| *Blattisociidae* | adapted to broad spectrum of habitats, predaceous on nematodes, dipteran larvae or other larvae of insects, acarid mites, insect eggs and larvae in stored foods |

Table S2. Analysis of variance of abiotic soil parameters between three sampling dates in Lordegan oak forests

| Variables | Parameters | *df* | *F* | *P* |
|---|---|---|---|---|
| Organic carbon | sampling date | 2 | 49.2 | < 0.0001* |
| | habitat | 1 | 24.1 | 0.0002* |
| | date × habitat | 2 | 0.36 | 0.7 |
| Nitrogen | sampling date | 2 | 25.0 | < 0.0001* |
| | habitat | 1 | 8.73 | 0.0009* |
| | date × habitat | 2 | 1.75 | 0.2 |
| pH | sampling date | 2 | 12.4 | 0.0007* |
| | habitat | 1 | 4.26 | 0.05* |
| | date × habitat | 2 | 0.99 | 0.39 |

*significant differences ($P < 0.05$); *df* – degrees of freedom; *F* – *F*-test statistic

**References in Electronic Supplementary Material:**

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