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POPLULATION DYNAMICS OF HOUSE DUST MITES
(ACARI: PYROGLYPHIDAE) IN SANTIAGO DE COMPOSTELA
(GALICIA, SPAIN)

BY J. M. AGRATORRES*, A. PEREIRA-LORENZO* and I. FERNANDEZ-FERNANDEZ*

SUMMARY: Fifteen houses in three different areas of Santiago de Compostela (Galicia, Spain) were sampled during a year, in order to analyse the distribution and abundance of house dust mites. In each house, a mattress and living room were sampled. House dust mites were present in every house, with more than 100 mites per gram of dust. Dermatophagoides pteronyssinus was the most prevalent species (75 %), followed by Euroglyphus maynei (13 %) and D. farinae (6.2 %). D. farinae was better represented in the urban zone than in the rural zone. Differences in relative humidity levels recorded between these habitats might explain this distribution.

RÉSUMÉ : Dans trois secteurs de la région de Santiago de Compostela (Espagne, Galice), 15 habitations sont suivies sur un an dans le but d’analyser la distribution et l’abondance des acariens des poussières. Dans chaque maison, le matelas et la pièce principale sont échantillonnés. Toutes les habitations montrent une faune de plus de 100 acariens par gramme de poussière. Dermatophagoides pteronyssinus est l’espèce la mieux représentée (75 %), puis Euroglyphus maynei (13 %) et D. farinae (6.2 %). D. farinae est mieux représenté dans les habitats urbains. Des différences de taux d’humidité relative entre habitat rural et urbain peuvent expliquer cette répartition.

RESUMEN: se ha efectuado el estudio faunistico y la dinámica poblacional de los ácaros del polvo en tres zonas diferentes de Santiago de Compostela (Galicia, España). Se ha encontrado acaros en todas las muestras examinadas y todas ellas presentaron una densidad de mas de 100 ácaros/g. de polvo. Se han identificado 3 especies de los propiamente denominados ácaros de polvo o domésticos, así como tres especies de los denominados ácaros del grano o productos almacenados y otras especies pertenecientes a otros grupos diferentes de ácaros. La especie mas abundante fue Dermatophagoides pteronyssinus (75 %).

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INTRODUCTION

House dust mites are one of the main causes of allergy in the world. Since the discovery that house dust mites (Acarina: Pyroglyphidae) cause allergic diseases (Voorhorst et al., 1967), several studies on their distribution have been carried out in Spain. However, data on house-dust mite distribution and density are limited to areas of Catalufia (Blasco & Portus, 1973, 1975; Portus et al., 1976) and knowledge of house dust mites in Galicia is very limited (Marcos et al., 1994). We therefore carried out the present work in order to make a systematic survey of house dust mites in Santiago de Compostela, as well as their relative abundance and frequency.

MATERIAL AND METHODS

The dust samples were collected from fifteen randomly selected houses, classified as being from rural, urban or mixed zones. In each house, the mite populations were assessed for two sites—mattress and living room—with samples taken every three months for a year, in accordance with the seasons.

We examined 120 samples collected with a vacuum cleaner. The extraction unit of the vacuum cleaner was modified so that small samples of dust could be collected. A cloth filter was placed between the aspiration tube and the stem. The time and sampling area of vacuuming were standardised (2 min/m²) (Platts-Mills et al., 1989). The cloth filters were sealed in a plastic bag with a label showing the collection data, sample number, temperature and relative humidity. As soon as possible (the same day), samples were examined to isolate the mites, according to method described by Fain et al., (1986) and Hart et al. (1987). The specimens were preserved in 70% alcohol before being individually mounted in Hoyer’s medium and identified.

RESULTS

Mites were present in all the houses examined. The mattress was the most infested site (72%) compared to the living room (28%).

The species identified are listed in Table 1. The majority of identified specimens were Astigmata of the families Pyroglyphidae (Dermatophagoides and Euroglyphus), Glycyphagidae (Glycyphagus and Lepidoglyphus) and Acaridae (Tyrophagus). Others species commonly found belonged to the Cheyletidae (Cheyletus sp.), Tarsonemidae (Tarsonemus sp.), Demodicidae (Demodex sp.), Oribatida and Mesostigmata.

Of the allergenic species, D. pteronyssinus was the most frequent (75%), followed by E. maynei (13%) and D. farinae (6.2%). The predatory mite, Cheyletus sp. (2.9%), was also observed in the samples that contained important populations of Pyroglyphidae and Glyciphagidae. Plant parasites, such as Tarsonemus sp., (0.79%), or the animal parasite Demodex folliculorum (0.02%), were occasionally represented.

With regard to the seasonal distribution of Pyroglyphidae (Figure 1), it was found that D. farinae and E. maynei were most often found during the spring, whereas D. pteronyssinus, was more abundant in the summer.

Figure 2 shows the distribution of pyroglyphid mites in the three area categories (urban, rural and mixed). D. pteronyssinus showed no significant differences between the different zones. Using the chi-square test, E. maynei showed a significant preference (p<0.01) for urban and mixed zones. The abundance


Tab 1: Occurrence of species in sampled homes.

<table>
<thead>
<tr>
<th></th>
<th>% in sampled homes</th>
<th>no. mites/g of dust (%)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ASTIGMATA</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pyroglyphidae</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Dermatophagoides pteronyssinus</em></td>
<td>100</td>
<td>195100 (70)</td>
<td>82090 (30)</td>
</tr>
<tr>
<td><em>Dermatophagoides farinae</em></td>
<td>53</td>
<td>16400 (72)</td>
<td>6350 (38)</td>
</tr>
<tr>
<td><em>Euroglyphus maynei</em></td>
<td>80</td>
<td>41220 (88)</td>
<td>5400 (12)</td>
</tr>
<tr>
<td>Glycyphagidae</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Glycyphagus domesticus</em></td>
<td>73</td>
<td>380 (38)</td>
<td>630 (62)</td>
</tr>
<tr>
<td>Lepidoglyphidae</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Lepidoglyphus destructor</em></td>
<td>47</td>
<td>260 (19)</td>
<td>1080 (81)</td>
</tr>
<tr>
<td>Acaridae</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Tyrophagus putrescens</em> spp.</td>
<td>40</td>
<td>130 (72)</td>
<td>50 (28)</td>
</tr>
<tr>
<td>PROSTIGMATA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cheyletidae</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Cheyletus spp.</em></td>
<td>100</td>
<td>6550 (62)</td>
<td>4080 (38)</td>
</tr>
<tr>
<td>Tarsonemidae</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Tarsonemus spp.</em></td>
<td>93</td>
<td>2390 (82)</td>
<td>540 (18)</td>
</tr>
<tr>
<td>Demodicidae</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Demodex folliculorum</em></td>
<td>20</td>
<td>20 (33)</td>
<td>40 (67)</td>
</tr>
<tr>
<td>ORIBATIDA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Oribatida</em></td>
<td>27</td>
<td>40 (80)</td>
<td>10 (20)</td>
</tr>
<tr>
<td>MESOSTIGMATA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Euroglyphus maynei</em></td>
<td>33</td>
<td>40 (40)</td>
<td>60 (60)</td>
</tr>
<tr>
<td>Total</td>
<td>265850 (72)</td>
<td>103080 (28)</td>
<td></td>
</tr>
</tbody>
</table>

DISCUSSION

In Galicia, 94% of identified mites belong to three species: *D. pteronyssinus*, *D. farinae* and *E. maynei*. This result shows that the house dust fauna does not differ from that of other European countries. The bedrooms and beds supported high mite population densities, agreeing with the results of previous authors (Maunsell et al., 1968; Bronswijk et al., 1973; Lang et al., 1978; Mosbech et al., 1991). The high frequency of mites in bedrooms stems from their direct and frequent association with humans, who provide food in the form of dead epidermal cells and other organic substances (Maunsell et al., 1968; Sesay et al., 1972; Bronswijk, 1973; Muncuoglu et al., 1976).

*D. pteronyssinus* is the most abundant species in Santiago. This could be important from the immunological point of view for the prevention and therapy
by hyposensitization of dust mite allergy. 100% of the houses surveyed were infested with mites and all the infested houses showed densities greater than 100 mites/g. This is a risk factor for sensitization and development of asthma (KORSGARD, 1983; ANONYMOUS, 1988; ARLIAN et al., 1990).

The seasonal variations in the concentration of mites were in agreement with previous studies. In temperate climates, the number of mites increases progressively in spring, reaching the highest value at the end of summer, after which it decreases in autumn and reaches the lowest value in winter (FAIN et al., 1990; LEEUWEN & AALBERSE, 1991; LINTNER & Brame, 1993). During summer, D. pteronyssinus was the most frequent species.

Relative humidity variations influence the distribution of species: D. pteronyssinus is considered to be dominant in humid areas and D. farinae in the less humid areas (LANG & MULLA, 1977; ARLIAN et al., 1981; SCHWARTZ et al., 1987). According to our measurements of relative humidity, the highest values were recorded in rural zone (annual mean of 61%) and the lowest in the urban zone (59%) (Table 2). We suspect that the higher presence of D. farinae in urban houses is a consequence of this microclimatic difference between urban and rural habitats.

<table>
<thead>
<tr>
<th>Urban</th>
<th>Mixed</th>
<th>Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T</td>
<td>H</td>
</tr>
<tr>
<td>Spring</td>
<td>21 ± 2.1</td>
<td>62 ± 5.2</td>
</tr>
<tr>
<td>Living-room</td>
<td>20 ± 2.1</td>
<td>61 ± 8.3</td>
</tr>
<tr>
<td>Summer</td>
<td>22 ± 2.5</td>
<td>57 ± 2.3</td>
</tr>
<tr>
<td>Living-room</td>
<td>23 ± 2.5</td>
<td>57 ± 2.3</td>
</tr>
<tr>
<td>Autumn</td>
<td>21 ± 1.5</td>
<td>65 ± 3.2</td>
</tr>
<tr>
<td>Living-room</td>
<td>20 ± 2.3</td>
<td>66 ± 4.1</td>
</tr>
<tr>
<td>Winter</td>
<td>19 ± 1.5</td>
<td>54 ± 7.1</td>
</tr>
<tr>
<td>Living-room</td>
<td>19 ± 1.4</td>
<td>54 ± 13.7</td>
</tr>
<tr>
<td>mean</td>
<td>21 ± 1.7</td>
<td>59 ± 5</td>
</tr>
</tbody>
</table>

Table 2: Seasonal temperature (T) and relative humidity (H) in the mattress and living room in sampled homes (means).

In the associated domestic fauna, Acaridae and Glycyphagidae were the most frequent mites on the floors. These mites prefer humid habitats contaminated with food (COOREMAN, 1944) and cause very important allergic reactions.

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