Qualitative and quantitative assessment of mites (Acarí) in domiciliary dust in rural dwellings in the “Zona da Mata” region, Minas Gerais, Brazil

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ABSTRACT. From July to September, 2000 (winter), and from January to March, 2001 (summer), 30 dust samples were collected for each season, from beds of rural dwellings located in farms in the geographical area named “Zona da Mata", Minas Gerais, Brazil. After being sorted, the mites were identified and quantified. The prevalence of mites in the samples was 100%. 891 mites were found in winter (22.97%), and 2988 in summer (77.03%). In winter, Dermatophagoides pteronyssinus (Trouessart, i897) was the most prevalent (55.00%), followed by Blomia tropicalis (Bronswijk, Cock & Oshima, 1973) (27.04%), Euroglyphus maynei (Cooreman, 1950) (8.85%), and predator mites from Cheyletidae family (8.07%). In summer, the most prevalent species was B. tropicalis (47.79%), followed by D. pteronyssinus (43.38%), Cheyletidae (6.87%), and E. maynei (1.28%). Few Dermatophagoides farinae (Hughes, i961), Chortoglyphus arcuatus (Troupeau, 1879), and mites from Tarsonemidae and Cunaxidae families were found, the last two occurring only in summer. No mites from Acaridae family were found. The greatest number of immature forms found in summer suggested a greater breeding activity in this season. It was also noted that different building materials and varied cleaning routines may influence the population size of domiciliary dust mites.

KEY WORDS. Air humidity, allergens, allergy, beds, countryside, seasonal variations.

Several arthropods are found in domiciliary fauna, mites playing an important role due to their prevalence and their association to allergic disorders in specially sensitive subjects. Although mite species in domiciliary dust may vary according to the geographical location, as temperature and air relative humidity influence the occurrence and size of their populations, a fact confirmed by Mallian et al. (1982, 1992, 1999), a few species are representative and prevalent enough to be of importance (Blythe 1976). Pyroglyphidae, the most important family, is composed of 18 genera and 46 species, 28 of which have been found on birds or in their nests and five in stored food or on mammals, the 13 remaining ones being found in domiciliary dust (Eain et al. 1990). According to Hart (1995), three species are routinely present in dwellings all over the world: Dermatophagoides pteronyssinus (Trouessart, 1897), Dermatophagoides farinae (Hughes, 1961), and Euroglyphus maynei (Cooreman, 1950).

Blomia tropicalis (Bronswijk, Cock & Oshima, 1973) (Glycyphagidae) has been playing an increasingly important role due to its high prevalence in tropical and sub-tropical regions. Suidasis pontificia (Oudemans, 1905), Tyrophagus putrescentiae (Schrank, 1781) and Alectophylax ovatus (Troupeau, 1879) (Acaridae) also have an outstanding role in our acarofauna and in the pathophysiology of respiratory allergy, as was demonstrated in studies of skin sensitivity in allergic subjects (Baggio et al. 1989; Mori et al. 1992). Amaral (1968), in studies carried out in São Paulo, was the first to report mites in domiciliary dust in Brazil. Other authors surveyed mite populations and biology in domiciliary dust from large Brazilian towns such as São Paulo, Porto Alegre, Recife and Salvador (Jorge-Neto et al. 1984, Bernd et al. 1994, Sarinho et al. 1996, Serravalle & Medeiros Junior 1998). Galvão & Guittón (1986) surveyed mite populations in the capitals of Brazilian states and Isle Fernando de Noronha, having even drawn a key to the identification of the main species found. No references regarding acarofauna in rural dwellings in Brazil were found. The aims of this study were to survey the acarofauna in the intradomiciliary ecosystem of rural dwellings in the Zona da Mata region of Minas Gerais, assess its seasonal variation (winter and summer), and seek a relationship between mite occurrence and different building materials and varied cleaning routines.

MATERIAL AND METHODS

Thirty samples of domiciliary dust were collected from randomly chosen rural dwellings in farms located in the mu-
In one sample it was similar in both seasons. When this was higher in winter than in summer, and mites collected in winter was lower than in summer; in six samples this figure was higher in winter than in summer, and in one sample it was similar in both seasons.

232 (5.98%) were destroyed and not amenable to identification, 261 were larvae (6.73%), 497 nymphs (12.81%), and identified, 261 were larvae (6.73%), 497 nymphs (12.81%), and 32.9°C (mean 29.08°C ± 2.25°C). Of the 3879 mites found in winter (429:211), while the numbers were similar (915:1008) in summer. E. maynei, on the other hand, presented a total prevalence of 3.32%. In winter, out of 780 adult mites identified, 69 belonged to that species (8.85%) and, in summer, out of 2109 adults identified, only 27 (1.28%). The low prevalence of D. farinae was noteworthy: five mites in winter (0.64%) and one in summer (0.05%). The predator mites belonging to the Cheyletidae family presented very similar prevalence rates: 8.08% in winter and 6.88% in summer. This study found mites from the Cheyletidae family in 16 of the 30 samples in winter (53.33%), and in 21 of the 30 samples in summer (70.00%). Mites from the Taronemidae family were not found in winter. Of all adult mites identified, 10 were from that family (0.5%). Another species with low prevalence was C. arcuatus, with only four mites in all adults identified (0.14%). Two mites (0.07%) from the Cunaxidae family were found in one of the 30 samples collected in summer.

RESULTS

All domiciliary dust samples were positive, mite prevalence being thus 100%. In all, 3879 mites were present in the 6g of dust. 891 mites were found in winter, representing a density of 297 mites/g of dust. Air relative humidity ranged from 32 to 72% (mean 52.53% ± 10.59%), with temperatures ranging from 18.8 to 32.2°C (mean 25.42°C ± 3.31°C). 2988 mites were found in summer, a density of 996 mites/g of dust. Air relative humidity ranged from 24.4°C to 32.9°C (mean 29.08°C ± 2.25°C). Of the 3879 mites found in this study, 2889 were in the adult stage (74.48%) and were identified, 261 were larvae (6.73%), 497 nymphs (12.81%), and 232 (5.98%) were destroyed and not amenable to identification. Of the total 3879 mites, 22.96% were found in winter and 77.04% in summer. In 23 samples, the total number of mites collected in winter was lower than in summer; in six samples this figure was higher in winter than in summer, and in one sample it was similar in both seasons.

Table I shows the distribution of the identified mites according to their families. Species from the Pyroglyphidae family predominated, followed by Glycyphagidae, Cheyletidae, Taronemidae, Chortoglyphidae and Cunaxidae, the last three being less representative. There was a greater prevalence of Pyroglyphidae followed by Glycyphagidae in winter, while the situation was reversed in summer. No mites from the Acaridae family were found. It is noteworthy that 100% of Glycyphagidae mites belonged to B. tropicalis species. Among the identified species (Tab. II), D. pteronyssinus was the most prevalent, accounting for 46.52% of all mites, followed by B. tropicalis, with 42.19%. The figures show that there were approximately twice as many D. pteronyssinus mites as B. tropicalis ones in winter (429:211), while the numbers were similar (915:1008) in summer. E. maynei, on the other hand, presented a total prevalence of 3.32%. In winter, out of 780 adult mites identified, 69 belonged to that species (8.85%) and, in summer, out of 2109 adults identified, only 27 (1.28%).

Table I. Distribution of adult mites identified by family in domiciliary dust samples from rural dwellings of the Zona da Mata region, Minas Gerais, Brazil, from July to September, 2000 (winter) and from January to March, 2001 (summer).

<table>
<thead>
<tr>
<th>Family</th>
<th>Total of mites</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pyroglyphidae</td>
<td>1446</td>
<td>50.05</td>
<td>940</td>
</tr>
<tr>
<td>Glycyphagidae</td>
<td>1219</td>
<td>42.19</td>
<td>1008</td>
</tr>
<tr>
<td>Cheyletidae</td>
<td>208</td>
<td>7.20</td>
<td>145</td>
</tr>
<tr>
<td>Taronemidae</td>
<td>10</td>
<td>0.35</td>
<td>10</td>
</tr>
<tr>
<td>Chortoglyphidae</td>
<td>4</td>
<td>0.14</td>
<td>1</td>
</tr>
<tr>
<td>Cunaxidae</td>
<td>2</td>
<td>0.07</td>
<td>2</td>
</tr>
</tbody>
</table>

Samples for this study were randomly collected in three distinct geographical regions: Coronel Pacheco (20 samples), Pedro Teixeira (5 samples), and Simão Pereira (5 samples). In order to assess the degree of similarity among the acarofauna of these three regions, taken in pairs, Sorenson’s Similarity Index (PINTO-COELHO 2000) was applied. The similarity was high: Ss = 0.73 between Coronel Pacheco and Pedro Teixeira, and between Pedro Teixeira and Simão Pereira, and Ss = 0.67 between Coronel Pacheco and Simão Pereira.
The methods mentioned a field form which, among its aims, included the putative effect of the type of house and building materials, as well as the cleaning routine of the houses and mattresses on the mite populations. It was noticed that in winter, houses with wooden roofs and floors presented a greater number of mites. In summer, although the number of mites was far greater than in winter, houses with the practice of sun-bathing mattresses had fewer mites.

**DISCUSSION**

The greater number of mites in summer was in accordance with literature data that point to a significant increase in mite population in domiciliary dust during this season. The record of a large number of young stages (larvae and nymphs) in this season points to an increased breeding activity (Tab. III). The absence of mites from the Acaridae family, frequently found in dust samples collected in several Brazilian cities (Jorge-Neto et al. 1984, Bernd et al. 1994, Serravalle & Medeiros Junior 1998), may have been occasional. Ezequiel et al. (2001) found 1.6% of mites from that family in the city of Juiz de Fora, situated in Zona da Mata, Minas Gerais. As for Glycyphagidae family, the finding of mites only from B. tropicalis species confirms results found by other authors, who found low occurrence of species from the other genera of this family in Brazil (Bernd et al. 1994; Serravalle & Medeiros Junior 1998). The greater prevalence of *D. pteronyssinus* and *B. tropicalis* species was to be expected. Baggio et al. (1989) stated that there was a prevalence of these species in South America, with alternation depending on climatic conditions (air relative humidity and temperature), nutritional factors and on the environment where sampling occurred. The predominance of *D. pteronyssinus* in winter suggests a greater resistance to low levels of air relative humidity, in comparison with *B. tropicalis*. This study showed a greater prevalence of *E. maynei* in winter. This species has water demands similar to those suggested for *D. pteronyssinus*. According to Hart (1995), it is the second most important species on the European coastline, rarely occurring in the United States, Russia, and in tropical countries like Brazil. Information about its biology is little, owing to the difficulty of growing colonies in the laboratory. The explanation for the predominance of *D. pteronyssinus* over *E. maynei* is thought to be linked to their different reproduction rates (Hart 1995). Further studies about *E. maynei* are necessary to understand the rationale underlying the greater prevalence in winter found in this study. *D. farinae* species was noticed to be of low prevalence. According to Arlan (1989) this species is more resistant to falls in air relative humidity, thus predominating in drier regions, while in high humidity regions *D. pteronyssinus* predominates. The geographical features of the region studied, habitually humid, anticipated a predominance of *D. pteronyssinus* over *D. farinae*, a fact demonstrated by this study findings. The biological and antigenic importance of mites from the Cheyletidae family await more specific studies. Bernd et al. (1994), in a study carried out in Porto Alegre, found Cheyletus malaccensis “in a reasonable number of dwellings”, coming fourth in prevalence, after *D. pteronyssinus*, *B. tropicalis*, and *T. putrescentiae*. Serravalle & Medeiros Junior (1998), in Salvador, Bahia, reported Cheyletus *sp.* in 50% of the samples studied, coming second only to *D. pteronyssinus*. These authors underscored the importance of studying these mites’ ability to provoke allergic reactions, due to their high prevalence. Ambrozio et al. (1989) found 41.1% of positive skin tests for *C. malaccensis* carried out in allergic patients in the city of São Paulo. Lozano (1979) in Caracas, Venezuela, found 55% of positive intradermal skin tests for Cheyletus *sp.* in asthmatic patients. As their Cheyletidae mites cultures were fed with Dermatophagoides *sp.*, he suggested that the results might be influenced by this fact. Assuming that any mite may be potentially allergenic, as long as there is a
concurrency of predisposing factors (a sensitive subject, masse- 
vie populations, and sufficiently long exposure), the Cheyletiidae family may be important in the causation of aller- 
gic disorders, its inclusion in allergic tests preceding immuno- 
therapy being warranted. Mites from the Tarsanemidae family 
are known in international literature as "mites from humid-
ity", this factor being thought of as the controller of popula-
tion size, a fact that might explain its presence only in samples 
collected in summer. In a study carried out monthly in Porto 
Alegre, Brand et al. (1994) found a total prevalence of 0.46% of 
*Tarsanemus sp*. Another species with low prevalence was 
*C. arcuatus*. This is a little studied species whose role as an aller-
gen remains elusive. Literature data show contradictory results as 
refers to its prevalence. Galvão & Guitton (1986), studying mites 
in domiciliary dust from Brazilian capitals and Isle Fernando 
de Noronha, found that species in six of the twenty-seven capi-
tals studied (São Luís, Aracaju, Salvador, Belo Horizonte, Rio de 
Janeiro and Florianópolis). A previous study, carried out in the 
city of São Paulo by Jorge-Neto et al. (1984), showed a greater 
prevalence for *C. arcuatus* (18.75%) than for *D. pteronyssinus* 
(9.93%), the former being second only to *B. tropicalis* (55.74%). 
Some differences among the studies, not only as refers to *C. 
arcuatus*, but also to other mite species in domiciliary dust, can 
possibly be accounted for by the different methods applied; 
the kind of dwelling, the sites of domiciliary sampling, climatic 
and factors, and species competition must also be taken into ac-
count. The finding of mites from the Cunaxidae family in one 
of the 30 samples collected in summer may be attributed to 
serendipity, as they prey on other plant and soil living species. 
The results from Sorensen's Similarity Index, which showed a 
similarity around 70% for species and families in the three re-
regions studied, suggested that there was not enough variation 
to account for expressive differences among the acarofauna. 

The greater number of mites in houses with wooden roofs 
and floors may be because this material keeps the environ-
ment warmer and wetter, contributing, somehow, to adequate 
intradomiciliary levels of temperature and humidity. Cracks and 
crevices in the roofs and floors are also good shelters for mites. 
Houses with the practice of sunbathing mattresses in summer 
had fewer mites, a fact which may be attributed to the heat 
and consequent dehydration, with its negative influence on 
mite populations. 

Qualitative assessment of mites in the intradomiciliary 
ecosystem of rural dwellings of Zona da Mata, Minas Gerais, 
did not show significant differences between rural and urban 
acarofauna. Data from studies to assess the frequency of sensi-
tization of rural populations to different mite species might be 
useful when considering immunotherapy against allergic symp-
toms in this group. Quantitatively, this study showed that air 
relative humidity is undoubtedly the most relevant factor, with 
a direct influence on mite population size. Due to its high preva-
ience, *B. tropicalis* was noticed to have become as important 
an allergen as *D. pteronyssinus*. This is in accordance with what 
has been seen in daily practice, where an increasing number of 
allergic patients show positivity to *B. tropicalis* in the skin 
prick test, regardless of positivity to *D. pteronyssinus*.

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