SCIENTIFIC NOTE

New Records of Pathogenic Fungi in Mites (Arachnida: Acari) from Brazil

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Novos Registros de Fungos Patogênicos a Ácaros (Arachnida: Acari) no Brasil

RESUMO - Relata-se o resultado de um inventário de patógenos de ácaros plantícolas e edáficos realizado através de um estudo da diversidade de ácaros de importância agrícola, principalmente no estado de São Paulo. Várias espécies de Eriophyoidea foram encontradas infectadas por espécies do fungo *Hirsutella* sp. Esporos de resistência de fungos Entomophthorales foram observados em ácaros das seguintes famílias: Ascidae, Phytoseiidae, Stigmaeidae, Tetranychidae e Tydeidae. Uma infecção do eriofiídeo *Retracus johnstoni* Keifer, associado à palmeira *Syagrus romanzoffiana* (Cham.) Glassman, por *Cladosporium* sp., também foi observada. Este fungo foi isolado e cultivado em meio artificial. Possíveis usos dos patógenos encontrados para fins de controle biológico são discutidos.

PALAVRAS-CHAVE: *Hirsutella, Cladosporium, Verticillium,* Entomophthorales.

ABSTRACT - During a study on the diversity of mites of agricultural importance, we made an inventory of pathogens infecting plant inhabiting and edaphic mites, mainly in the State of São Paulo, Brazil. Several species of Eriophyoidea were found to be infected by *Hirsutella* sp. Resting spores of Entomophthorales were observed in mites of the following families: Ascidae, Phytoseiidae, Stigmaeidae, Tetranychidae and Tydeidae. A *Cladosporium* sp. infection was noted in the eriophyid *Retracus johnstoni* Keifer, a pest of the palm tree *Syagrus romanzoffiana* (Cham.) Glassman. The fungus was isolated and cultured in artificial medium. The possible use of the observed pathogens for microbial control purposes is discussed.

KEY WORDS: *Hirsutella, Cladosporium, Verticillium,* Entomophthorales.

There is an increasing interest in pathogens of mites as indicated by the large number of recent reviews on this subject (McCoy 1996, Poinar and Poinar 1998, Chandler *et al.* 2000, Van der Geest *et al.* 2000). This interest may be attributed to the potential that mite pathogens might have for the control of noxious mite species. These pathogens were proven in several instances to be good alternatives for chemical insecticides (see Chandler *et al.* 2000).

In a study on the diversity of mites of agricultural importance in the State of São Paulo, an inventory was made of pathogenic organisms infecting plant inhabiting and edaphic mites. Mites were collected on various trees and herbaceous plants mostly in the Atlantic rainforest and the arid areas of the State. A few samples were also taken from a rubber tree plantation in Itiquira, State of Mato Grosso. In addition, a number of pre-selected mites that had previously been mounted and that were already present in the mite reference collection of the "Departamento de Entomologia, Fitopatologia e Zoologia Agrícola, Escola Superior de Agricultura Luiz de Queiroz, Universidade de São Paulo (ESALQ)" were also investigated for the presence of pathogens. Pathogens in mounted specimens were identified by visual inspection under light microscopy. When the presence of pathogenic fungi was suspected in live material, mites were placed in moist chambers (petri dishes with water soaked cotton wool) to induce sporulation, as sporulation is usually required for proper identification of pathogenic fungi. In a number of instances, infected mites were placed on an artificial medium (potato-dextrose agar with chloramphenicol) in order to isolate the fungus.

Samples were taken from approximately 80 different plant species, from a large number of trees and herbaceous plants examined in the Atlantic rainforest in March 2001. However, the number of mites observed in these samples was relatively small and pathogens were only detected in a few instances. In Cananéia, *Neozygites* sp. capilliconidia were found on *Atrichoproctus* cf. *uncinatus* Flechtmann (Tetranychidae) on the host plant *Desmodium incanum* D. C. (Fabaceae). *Tetranychus* sp. (Tetranychidae) collected in Jupiá from *Musa cavendish* Lambert (Musaceae) leaves were reared in the laboratory for several generations; some specimens were infected by a fungus that was subsequently identified as *Verticillium* sp. It is not certain whether this disease was already present in the wild population or whether the mites

became infected in the laboratory.

A *Cladosporium* sp. infection was found in *Retracus johnstoni* Keifer (Eriophyoidea: Phytoptidae) on the palm tree *Syagrus romanzoffiana* (Cham.) Glassman (Arecaceae), in April 2001, on the campus of ESALQ, Piracicaba. This is probably the first record of a *Cladosporium* sp. infection in a mite species. The fungus was isolated and cultured on potato-dextrose agar.

In several species of Eriophyoidea, infection by *Hirsutella* sp. (Deuteromycetes) was observed. *Hirsutella thompsonii* Fisher was found in *Calacarus heveae* Feres on the rubber tree *Hevea brasiliensis* Muell. Arg. (Euphorbiaceae) in Itiquira. This eriophyid species is a major pest of rubber in Brazil, causing premature leaf drop. The occurrence of this pathogen has been previously reported by Tanzini *et al*. (2000). In the present survey, infections were also observed in several locations in the State of São Paulo (Nhandeara, Monte Aprazível and on the campus of ESALQ, in Piracicaba). *Hirsutella* sp. was also observed in the eriophyid *Notostrix attenuata* Gondim Jr., Flechtmann & Moraes from the palm tree *Butia archeri* (Glassman) Glassman (Arecaceae). The infection was noted during the first week of May 2001 in a remnant arid forest near Pirassununga, São Paulo. It was possible to isolate and culture the fungus on a potato-dextrose agar. *H. thompsonii* was also observed in *Epitrimerus goniathrix* Micos & Flechtmann (Eriophyidae) on the tree *Hura crepitans* L. (Euphorbiaceae) on the ESALQ campus in Piracicaba. Infection of *E. goniathrix* by the same fungus has been detected earlier (M. Zacharias, pers. comm.). A survey of the results is given in Table 1.

Several mounted specimens in the mite reference collection of ESALQ were investigated for the presence of fungus infections. *Hirsutella* sp. infections and spores of Entomophthorales were observed in several species of mites. Results of these investigations are presented in Table 2.

The fungi isolated during this project have been deposited in the culture collection of the Laboratório de Patologia dos Insetos, ESALQ-USP, Piracicaba, São Paulo, Brazil.

The present survey showed several species of Eriophyoids to be infected by *Hirsutella* sp. Mites of this family may cause considerable damage to plants, e.g. to rubber trees in the States of Mato Grosso, Mato Grosso do Sul and São Paulo and in several species of palm trees. *Hirsutella* sp. may cause decimation of mite populations. A good example is the regularly occurring epidemics of this fungus in *Calacarus* populations in rubber trees in Itiquira, Mato Grosso (Tanzini *et al.* 2000). However, these epidemics usually seem to start when serious damage by the mite has already occurred. Collection of isolates from different geographical regions may yield strains of the fungus that cause epidemics earlier in the season.

Table 1. Pathogenic fungi observed in Acari collected in the field in the state of São Paulo.

Fungal pathogen	Species	Mite host Family	Host plant	Collection site
Neozygites sp. (Capilliconidia)	*A. cf. uncinatus*	Tetranychidae	*D. incanum*	Cananéia
Cladosporium sp.	*R. johnstoni*	Eriophyoidea: Phytoptidae	*S. romanzoffiana*	Piracicaba
H. thompsonii	*E. goniathrix*	Eriophyidae	*H. crepitans*	Piracicaba
Hirsutella sp.	*N. attenuata*	Eriophyidae	*B. archeri*	Pirassununga
H. thompsonii	*C. heveae*	Eriophyidae	*H. brasiliensis*	Nhandeara, Monte Aprazível, Piracicaba
Verticillium sp.	*Tetranychus*	Tetranychidae	*M. cavendish*	Jupiá

Table 2. Pathogenic fungi observed in mounted specimens of Acari present in the collection of the Depto. Entomologia, Fitopatologia e Zoologia Agrícola, ESALQ campus Piracicaba, USP.

Fungal pathogen	Species	Mite host Family	Host plant	Collection site
Entomophthorales Thin-walled resting spores	*Agistemus*	Stigmaeidae	*Campomanesia pubescens*	Pirassununga, PE
Entomophthorales Thick-walled resting spores	Not identified	Stigmaeidae	*C. pubescens*	São Carlos, SP
Entomophthorales Thin-walled resting spores	*Asca* sp.	Ascidae	*C. pubescens*	Luiz Antonio, SP
Entomophthorales Thin-walled resting spores	*Amblyseius igarassuens*is Gondim Jr. & Moraes	Phytoseiidae	-	Igarassu, PE
Hirsutella sp.	*Tarsonemus* sp.	Tarsonemidae	*C. pubescens*	São Carlos, SP
Hirsutella sp.	*Amrineus cocofolius* Flechtmann	Eriophyidae	*B. archeri*	Pirassununga, PE
Hirsutella sp.	*R. johnstoni*	Eriophyidae	*B. archeri*	Serra dos Orgãos, RJ
Hirsutella sp.	*Propilus syagris* Gondim Jr., Flechtmann & Moraes	Eriophyidae	*S. romanzoffiana*	Cananéia, SP

Hirsutella infections apparently also occur in eriophyids on palm trees. Several species of this mite family cause considerable damage to palm trees. It seems advisable to study *Hirsutella* strains isolated from palm tree eriophyids more extensively, as they may be used in biological control programs.

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