

CONTRIBUTION TO THE KNOWLEDGE  
OF PHYTOSEIID MITES ASSOCIATED WITH VINEYARDS  
IN THE "REGIÃO DEMARCADA DO DOURO"  
(PORTO WINE REGION)

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PHYTOSEIID MITES  
GRAPEVINE  
PORTUGAL  
*TYPHLODROMUS PYRI*  
*KAMPIMODROMUS ABERRANS*  
*TYPHLODROMUS PHIALATUS*

**SUMMARY:** To obtain data on the main species of phytoseiid mites occurring at Região Demarcada do Douro (R.D.D.), a survey was carried out by the end of July-beginning of August, 1997, in 61 vineyards, from which 41 unsprayed and 20 sprayed according to the usual practices in the region. From the unsprayed vineyards, 18 were situated in the north region of the Douro river and 23 belonged to the south region of this river. The sprayed vineyards were all situated in the north region of the Douro. Sampling was done on 20 random selected leaves from five plants in each vineyard, and phytoseiids extracted and identified. Seven species were found: *Euseius finlandicus* (Oudemans), *E. stipulatus* (Athias-Henriot), *Kampimodromus aberrans* (Oudemans), *Neoseiulus californicus* (McGregor), *Typhlodromus athenas* Swirski & Ragusa, *T. phialatus* Athias-Henriot and *T. pyri* Scheuten. The dominant species were *T. pyri* and *K. aberrans*. *T. pyri* which represented 47.2% of total the individuals found mostly in the South region of Douro, in cooler sites. *K. aberrans*, 46.7% of the total individuals, dominated in the North region of Douro, in warmer and dryer places. *T. phialatus* and *T. athenas* were common in the sprayed vineyards. The dominant species of phytoseiids found in the R.D.D., *T. pyri* and *K. aberrans*, are known as the most efficient agents against spider mites in many vine growing areas of Europe.

**RÉSUMÉ:** L'étude des espèces principales de phytoseiides de Região Demarcada do Douro (R.D.D.), a été réalisée de fin juillet au début d'août 1997 dans 61 vignes (41 non traitées et 20 traitées traditionnellement). Dans le lot non traitées, 18 sont situées au nord du fleuve Douro et 23 au sud alors que les vignes traitées sont toutes au nord. Vingt feuilles furent récoltées au hasard sur 5 pieds dans chaque vignee et les Phytoseiides extraits et identifiés. Sept espèces ont été récoltées : *Euseius finlandicus* (Oudemans), *E. stipulatus* (Athias-Henriot), *Kampimodromus aberrans* (Oudemans), *Neoseiulus californicus* (McGregor), *Typhlodromus athenas* Swirski & Ragusa, *T. phialatus* Athias-Henriot et *T. pyri* Scheuten. Les espèces dominantes sont *T. pyri* et *K. aberrans*. *T. pyri* représente 47.2% des effectifs, est surtout récolté au sud du Douro, dans les endroits frais. *K. aberrans*,

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(46.7% des effectifs) domine au nord dans les situations plus chaudes et plus sèches. *T. phialatus* et *T. athenas* sont communs dans les vignes traitées. Les espèces dominantes de la région, *T. pyri* and *K. aberrans*, sont connus comme les plus efficaces agents contre les tétranyques des régions viticoles en Europe.

### INTRODUCTION

Mites are well-known pests in many vine growing areas in the world. In Portugal, vineyards are often damaged by the grape rust mite, *Calepitrimerus vitis* (Nalepa) and the grape bud mite, *Colomerus vitis* (Pagenstecher). However, as opposed to the situation in many European countries such as Germany (ENGLERT & MAIXNER, 1989), France (KREITER & BRIAN, 1989), Italy (DUSO *et al.*, 1989; RAGUSA & CIULLA, 1991) and Switzerland (BAILLOD, 1984), the spider mites rarely become worrying. Among the proposed hypothesis to explain the increase of the damage caused by these pests, the most consensual one is that of the destruction of natural occurring species of phytoseiid mites by non selective pesticides used to control the grape moth (CHABOUSSOU, 1963; ARIAS & NIETO, 1981; KREITER & BRIAN, 1989). In Portugal, phytoseiid mite species of vineyards were

inventoried by authors such as CARMONA & FERREIRA (1989), FERREIRA (1995), OTERO *et al.* (1999) and AGUIAR *et al.* (2000), namely in the coastal zone north of the country and in Alentejo, Ribatejo and Estremadura. However there is no knowledge concerning the species occurring at the “Região Demarcada do Douro”, in spite of its great economic importance as the Porto Wine producing region.

Based on the above conditions and foreseeing an intensification of chemical control in the portuguese vineyards, to control pests like leafhoppers and even the grape moth, it is necessary to have a good knowledge about the species of phytoseiid occurring in the above mentioned vineyards, in order to preserve them. The present study aims to contribute for the identification of the phytoseiid mites that, in this context, would be of most interest in the “Região Demarcada do Douro” (R.D.D.) — Porto Wine Region.

Phytoseiid mites species	North of the Douro River				South of the Douro River	
	Abandoned vineyards		Sprayed vineyards		Abandoned vineyards	
	Number	Percentage	Number	Percentage	Number	Percentage
<i>Kampimodromus aberrans</i> (Oudemans)	173	71.5	108	65.9	141	28.4
<i>Typhlodromus pyri</i> Scheuten	59	24.4	20	12.2	347	69.8
<i>Typhlodromus phialatus</i> Athias-Henriot	8	3.3	23	14.0	5	1.0
<i>Typhlodromus athenas</i> Swirski & Ragusa	1	0.4	10	6.1	0	0.0
<i>Euseius finlandicus</i> (Oudemans)	0	0.0	3	1.8	1	0.2
<i>Euseius stipulatus</i> (Athias-Henriot)	0	0.0	0	0.0	1	0.2
<i>Neoseiulus californicus</i> (McGregor)	1	0.4	0	0.0	2	0.4
Total	242	100.0	164	100.0	497	100.0

TABLE 1: Number and percentage of each of the phytoseiid species identified in the abandoned and sprayed vineyards at the north and south of the Douro river, relatively to the total number of specimens identified in this region

### MATERIAL AND METHODS

Phytoseiid mites were surveyed in 61 vineyards of the Porto Wine region, between the end of July and the beginning of August 1997. From these vineyards,

41 were abandoned and chemically unsprayed for many years, and 20 were regularly sprayed with currently used pesticides. A typical spray program includes four fungicidal treatments against the downy mildew, *Plasmopara viticola* (Berkeley et Curtis) Berlese

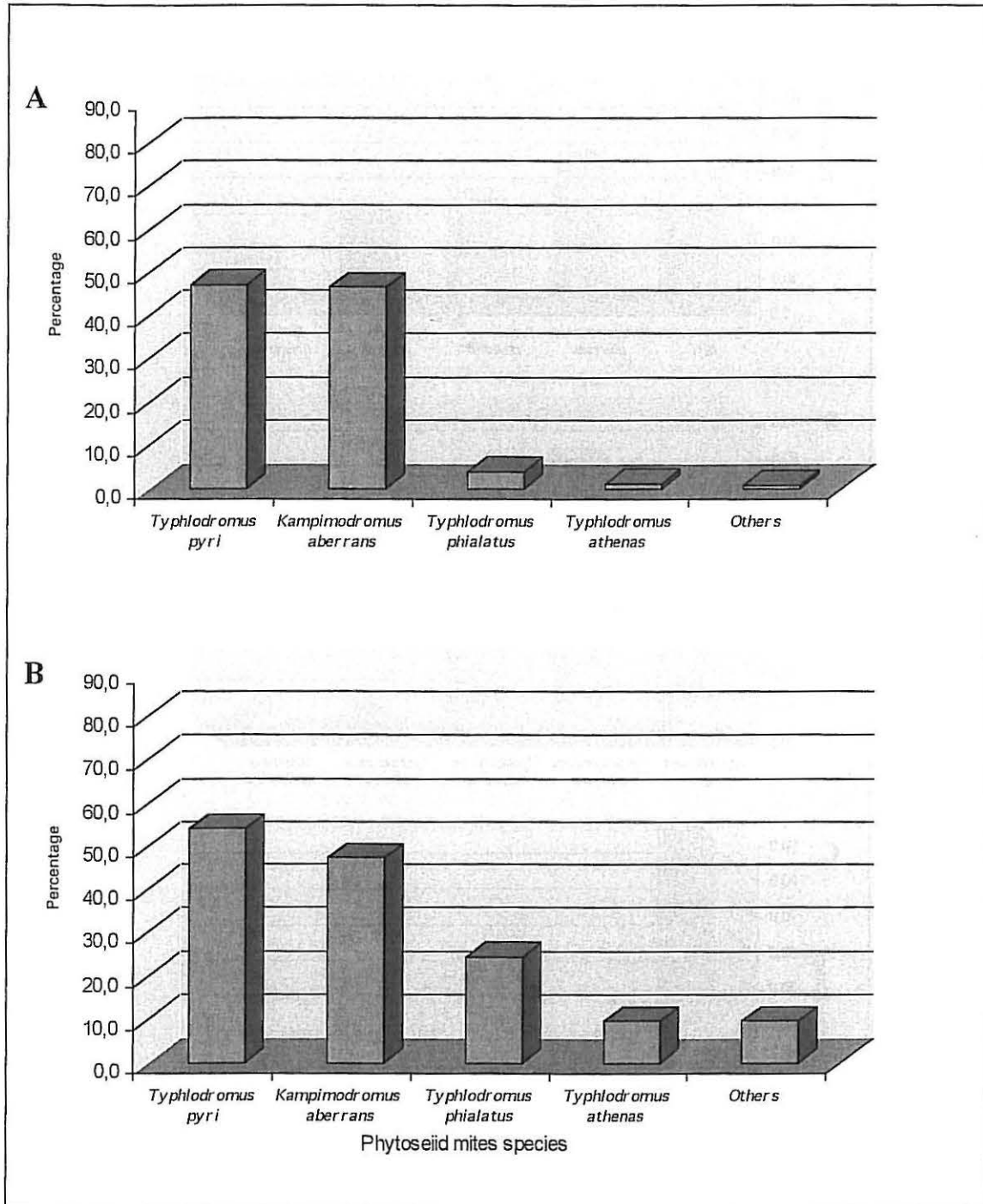


FIG. 1. Distribution of phytoseiids. A — Individuals in percentage in the sampled vineyards (% total sampled); B — Presence (% of vineyards) of phytoseiid in the sampled vineyards. "Região Demarcada do Douro" — North of Portugal, 1997.

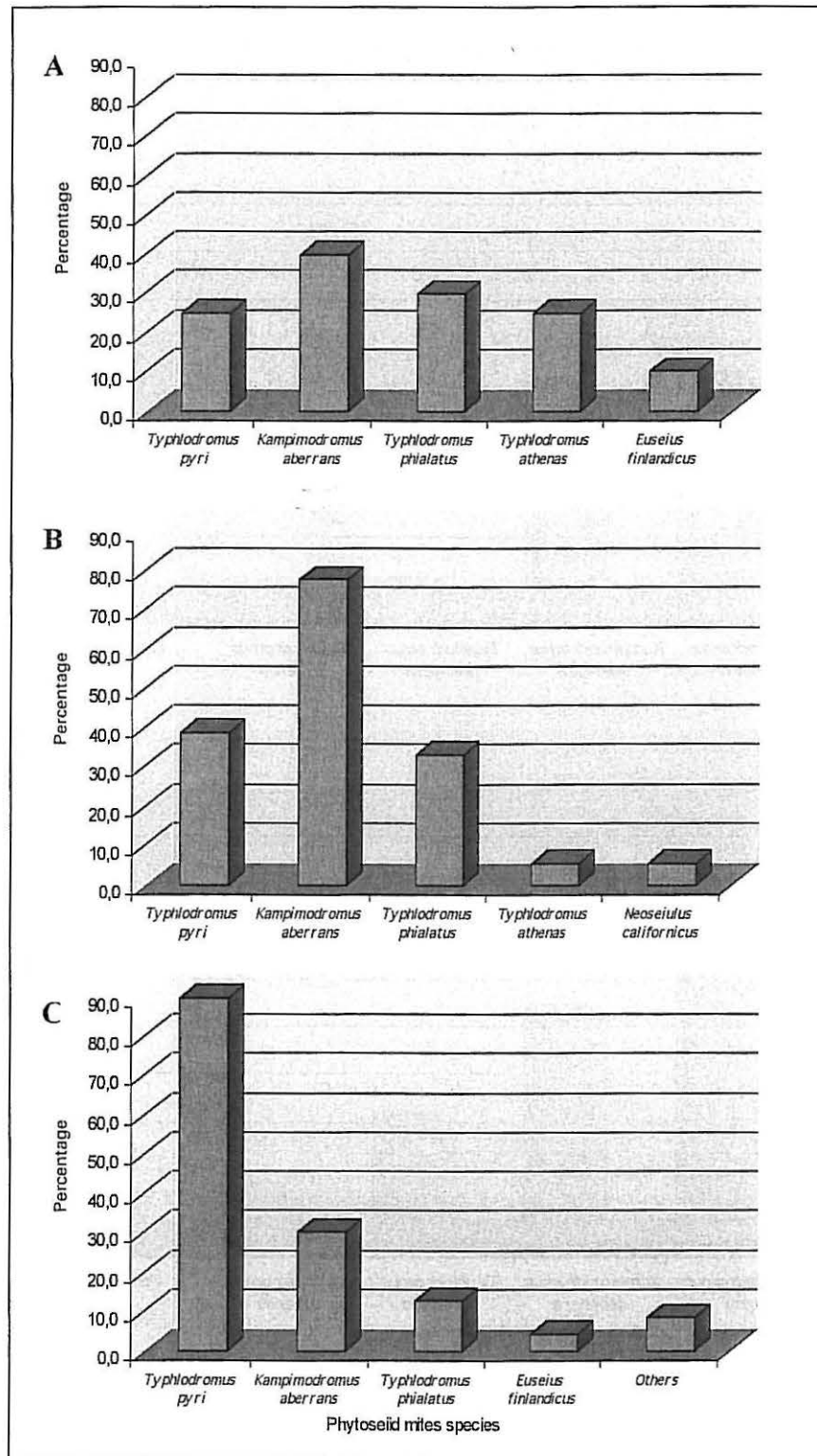


FIG. 2. A — Sprayed vineyards, prevalence of phytoseiids, % identified individuals (North of the Douro river); B — Abandoned vineyards, prevalence of phytoseiid individuals (North of the Douro River); C — Abandoned vineyards, prevalence of phytoseiid individuals (South of the Douro River).

et De Toni, and three to four treatments against the powdery mildew, *Uncinula necator* Tuckeri, using sulphur and sterol biosynthesis inhibitors (SBI). Acaricides or insecticides were not used.

From the unsprayed vineyards, 18 were located on northern Douro and 23 in the south of this river, while the sprayed vineyards were all located on northern Douro.

In each vineyard, five vines were randomly chosen and four leaves from the middle part of the vine collected. Phytoseiids were extracted from the leaves using BERLESE funnels according to the methodology described by COSTA-COMELLES *et al.* (1986). All collected specimens were permanently mounted with Hoyer's medium and identified to species.

#### RESULTS

Seven species of phytoseiid mites were collected and identified: *Euseius finlandicus* (Oudemans), *E. stipulatus* (Athias-Henriot), *Kampimodromus aberrans* (Oudemans), *Neoseiulus californicus* (McGregor), *Typhlodromus athenas* Swirski & Ragusa, *T. phialatus* Athias-Henriot and *T. pyri* Scheuten. *T. pyri* and *K. aberrans* were the dominant ones, both in the number of identified specimens and in the number of occupied vineyards. Thus, the first one was found in 54.1% of the sampled vineyards (61) and represented 47.2% of total identified specimens (903). *K. aberrans* represented 46.7% of the total and was found in 47.5% of the vineyards (FIG. 1). This species was the dominant in the vineyards North of the Douro river (71.5% in the abandoned vineyards and 65.9% in the sprayed vineyards). It was found in 77.8% of the vineyards corresponding to the first of the situations and in 40.0% of the vineyards which correspond to the second situation (TABLE 1, FIG. 2). In the abandoned vineyards, the second species in order of importance was *T. pyri* (24.4%) and was found in 38.9% of the vineyards. *T. phialatus* was found in 33.3% of these vineyards (3.3% of the specimens). Two other species, *N. californicus* and *T. athenas* were represented in a single vineyard by one only specimen. In the sprayed vineyards, *T. phialatus* was the second most representative species, followed closely by *T. pyri*. Thus, the first of these species represented 14.0% of

the identified specimens and was found in 30.0% of the vineyards and the second one represented 12.2% of the identified specimens and was found in 25.0% of the sampled vineyards (TABLE 1, FIG. 2). In these vineyards the occurrence of *T. athenas*, was significative, representing 6.1% of the identified specimens and was found in 25.0% of the vineyards. Another identified species in these vineyards was *E. finlandicus*, three of its specimens having been observed in two vineyards.

In the southern Douro vineyards, *T. pyri* dominated largely, representing 69.8% of the specimens obtained and occupying 91.3% of the sampled vineyards (TABLE 1, FIG. 2). Following this species was *K. aberrans*, with 28.4% of the identified specimens and observed in 30.4% of the sampled vineyards. Furthermore, five specimens of *T. phialatus* were identified in three vineyards and two specimens of *N. californicus*, one specimen of *E. finlandicus* and one specimen of *E. stipulatus* were identified in one vineyard each.

#### DISCUSSION

Similarly to what happen in other vine growing areas of Europe, namely in Italy (LIGUORI, 1980; LAFFI, 1982; IVANCICH-GAMBARO, 1982; DUSO *et al.*, 1983; CORINO, 1985), Switzerland (BAILLOD & VENTURI, 1980), France (KREITER & BRIAN, 1989; KREITER *et al.*, 2000) and Germany (ENGLERT & MAIXNER, 1989), the phytoseiid species *T. pyri* and *K. aberrans*, seems to be the most common ones in R.D.D. *K. aberrans* apparently dominates in the north region of the Douro river, while *T. pyri* seems to be more frequent in the relatively cooler and damper areas south of the river. It must be stressed that these two species are considered, in many areas of the world, as effective natural control agents of tetranychid mites. Thus, *T. pyri* is one of the most commonly phytoseiid mite used in the biological control of the red spider mite, *Panonychus ulmi* (Koch), in Switzerland, northern Italy and Great Britain (GARCÍA-MARÍ *et al.*, 1990). *K. aberrans* is considered the most effective species in controlling spider mite populations in North-Eastern Italian vineyards in particular when selective pesticides are used (CAMPORESE &



DUSO, 1996). This species was re-introduced in vineyards where it has been previously destroyed by non selective sprays, while in other vineyards it occurred naturally as soon as the mentioned sprays were replaced by selective ones. It is worthwhile to mention that both *T. pyri* and *K. aberrans* can develop strains tolerant or resistant to insecticides and fungicides used in vineyards (CORINO *et al.*, 1986; HLUCHÝ *et al.*, 1991; KREITER *et al.*, 1992; VETTORELLO & GIROLAMI, 1992; POSENATO, 1994), something which improve the performance of these species when the pesticide application is needed, namely into integrated pest management programs.

Another species of interest is probably *T. phialatus*, which was common mostly in the sprayed vineyards. This species, not reported on grapevines in Portugal by CARMONA & DIAS (1996), was thought to be strictly endemic to Mediterranean regions. However, according to KREITER *et al.* (2000) is much more widespread. Few data are available about *T. phialatus*: it was the most common phytoseiid found in vineyards of Valencia region, in Spain (GARCÍA-MARÍ *et al.*, 1987), it is taxonomically close to *T. pyri* and it has a predatory capacity and similar development. It may play an equal role in controlling spider mites in areas of relatively hot and dry weather (GARCÍA-MARÍ *et al.*, 1990).

#### CONCLUSIONS

This survey has shown the occurrence of phytoseiid species, in R.D.D., which are well known as important predators of tetranychid mites in many vine growing areas of Europe, that is *T. pyri* and *K. aberrans*. These predators are probably responsible for an efficient control of the phytophagous mites in R.D.D. Therefore, it is of great importance to preserve them and to increase their presence in vineyards, namely by avoiding the use of toxic pesticides.

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