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MITES ASSOCIATED WITH PARKS AND ORNAMENTAL GARDENS IN URBAN AREA – BUCHAREST

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Abstract

The paper presents the species of mites found on woody plants and flower plants from parks and ornamental gardens or private ornamental gardens in the north of Bucharest. It describes the frequency of attack, host plants, preference for a host plant, attack distribution on plant, the conditions for the attack to produce, the unaesthetic aspect of the attacked plant and possibilities of control. The excessive drought and high temperatures during the summer months favours the development of phytophagous mites, species belonging to the families Tetranychidae (Tetranychus urticae Koch., Eotetranychus tiliarium Hermann), Eriophyidae (Eriophyes tiliae exilis Nal., Eriophyes tiliae rudis Nal., Eriophyes triradiatus Nal.) and Tarsonemidae (Polyphagotarsonemus latus Banks). These species of mites have as host plants species of genera Tilia (T. cordata, T. platyphyllos, T. tomentosa), Salix (S. babylonica, S. matsudana "tortuosa"), Rosa, Impatiens etc. These pests sting and suck the sap from the plants, the leaves become yellow, dry and fall. The loss of leaves during the summer period reduces the accumulation of substances for provisions, the plants become sensitive to frost and draught and their ornamental value decreases. The paper also presents Schizotetranychus (Stigmeopsis) celarius Banks species, pest new to Romania, which entered the country with the host plant Phyllostachys aureosulcata. S. celarius produces a white web, in the shape of a nest, on the lower side of the Phyllostachys aureosulcata leaves. On the feeding site appear white-yellow spots that may look similar to variegation. Knowing, identifying and controlling these mites is very important in order to maintain the decorative value of plants from parks and gardens.

Key words**:** *mites, ornamental plants, control difficulties*

INTRODUCTION

In all developed countries, with a high urbanization level, the conservation and creation of verdure spots are represent an important to mean of protection for the humans and their life environment. They produce the oxygen necessary for life, reduce air pollution, decorative towns and creates a favorable microclimate for relaxing outdoors. Some of the have a cultural importance (gardens, museum gardens, historical or exhibition gardens) or scientific importance (botanical gardens, reservations, national parks) [3].

The change of the climatic conditions from the last years have determined the multiplication and spreading of several pests associated with parks and ornamental gardens like tetranychid, eriophyid and tarsonemid mites. These destroy the beauty of plants and gray colour of buildings is dominant.

MATERIAL AND METHOD

The paper presents the species of mites present on woody plants and flower plants from the urban environment, parks and public or private ornamental gardens situated in the north part of Bucharest.

The observations were made in green areas from the north part of Bucharest, during the period of 2008– 2011.

In order to monitor the mites associated to the ornamental plants from parks and gardens, trips were made periodically in the mentioned areas and pests were detected on different types of host plants.

For the species of the genus *Tilia* were annalyzed 262 trees (86 trees *Tilia cordata*, 25 trees *Tilia platyphyllos*, 139 trees *Tilia tomentosa* and 12 trees *Tilia americana*) placed in parks, public or private ornamental gardens and straightways along the streets. 25 leaves from the bottom of the tree head were annalyzed and the mite species was established taking into the

account the morphological criteria and the attack type (the gall's form) [2, 4, 5, 8]. The intensity of the attack was evaluated taking into account the percentage in which the leaves were attacked, related to the total number of leaves attacked.
It describes the frequency of attack, host plants, preference for a host plant, attack distribution on plant, the conditions for the attack to produce, the unaesthetic aspect of the attacked plant and possibilities of control.
Samples of attacked plants (damage type) and the respective pests were gathered, in order to be determined in the laboratory. The collected material was photographed directly or inside a lab using the Nikon camera.

RESULTS AND DISCUSSIONS

High temperatures and excessive draught during the summer months have favoured the development of phytophagus mites. Thus, after observations were made there were found species of mites belonging to the families *Tetranychidae* (*Tetranychus urticae* Koch., *Eotetranychus tiliarium* Hermann), *Eriophyidae* (*Eriophyes tiliae exilis* Nal., *Eriophyes tiliae rudis* Nal., *Eriophyes triradiatus* Nal.) and *Tarsonemidae* (*Polyphagotarsonemus latus* Banks), and the host plants belong to the genus *Tilia* (*Tilia cordata*, *T. platyphyllos*, *T. tomentosa, T. americana*), *Salix* (*Salix babylonica*, *S. matsudana "Tortuosa"*), *Rosa, Impatiens* (table 1). These pests sting and suck the sap from the plants, the leaves become yellow, dry and fall. The loss of leaves during the summer period reduces the accumulation of substances for provisions, the plants become sensitive to frost and draught and their ornamental value decreases. The species *Tetranychus urticae* Koch infected strongly the plants of *Rosa* during the entire observation period. The attack manifested especially in the areas in which the air circulation was decreased, as a result of a high planting density, interior gardens enclosed by high walls and buildings. Also, the type of pruning of plants during spring influenced the mites setting. The plants with a high number of scapes and with a compact distribution constituted the first pest hole of mites. When no control measures were taken it resulted defoliation of plants.
Eotetranychus tiliarium Hermann represented the most spread specie at the linden plants and with a strong impact on the ornamental value of the plants. The attack manifested itself strongly on the trees planted in a row, the asphalt effect contributing to the pest installation. The first pests were settled at the bottom of the trees and where the branches of the adjoining trees intersect. The leaves of these trees become grey-yellowish and in the middle of summer they were completely withered (Photo. 1). Also, high temperatures and excessive drought favoured the attack of this species. The trees planted isolated in parks were not attacked by this mite. As regards the preference for the host plant, this proved to be the specie *Tilia cordata*. In 2008, 86 trees of *Tilia cordata* were examined, in 2009 their number decreased to 78, in 2010 to 75 and in 2011, 71 trees. These were elliminated as a result of their withering, caused by the complex – mites, draught, sensitivity to pollution.

Photo 1. *Eotetranychus tiliarium* on *Tilia cordata*

In present it is known the fact that the sylviculturists consider the species of *Tilia* sensitive to pollution an don't recommend them to be planted in straightway along the streets. Taking also into account their sensitivity to the tetranychid mites attack we recommend them to be used carefully in urban arrangements.
The species of eriophyid mites met on the linden trees form different types of galls on the leaves, that can cause physiologic disfunctions to the host plants and can affect their ornamental features.
Eriophyes tiliae tiliae Pgst. was found on *Tilia platyphyllos, Tilia cordata* and *Tilia tomentosa*

(Photo 2). The most attacked were the young plants of *Tilia tomentosa* with a height up to 3 m. The big trees of *Tilia tomentosa* were attacked in the lower levels of the tree head. The species *Eriophyes tiliae rudis* Nal. Was present only on *Tilia tomentosa* (Photo 3). *Eriophyes tiliae exilis* Nal. was found on *Tilia platyphyllos* and *Tilia cordata* (table 2). The trees of *Tilia americana* weren't infected by mites during the studied period. The species of eriophyid mites didn't cause withering effects on plants, their attack causing just an unaesthetic aspect on the plants in urban areas.

Table 1. Mites associated with parks and ornamental gardens

Pest	Host plant	Damages	Impact
Tetranychus urticae Koch.	*Rosa spp.*	- delicate cobweb on lower side of leaves with black excrements; - yellowing of the leaves; - delicate cobweb on the growing peaks and floral buds.	- the plants lose their leaves in the middle of the summer.
Eotetranychus tiliarium Hermann	*Tilia cordata*	- discolouration of leaves; - delicate cobweb on the lower side of leaves.	- the leaves turn yellow and wither during summer; - the leaves fall during summer.
Eriophyes tiliae tiliae Pgst.	*Tilia platyphyllos* *Tilia cordata* *Tilia tomentosa*	- formed conical galls on the upper part of the leaves; - galls about 8 mm long and frequently coloured red; - the tip of the gall is sharp.	- the galls turn brown with time and wither, giving the plants an ugly appearance.
Eriophyes tiliae rudis Nal.	*Tilia tomentosa*	- formations with a felty aspect on the lower side of the leaves caused by the hypertrophy of the tomentum; - blistering of the tissues on the upper side of the leaves (galls).	- the galls turn brown and the leaves wither.
Eriophyes tiliae exilis Nal.	*Tilia platyphyllos* *Tilia cordata*	- form galls with a felty aspect on the lower side of the leaves close to the nervures and at their point of insertion; - on the upper side of the leaves, near the galls the tissues are slightly blistered and discoloured.	- the galls turn brown and the leaves turn yellow.
Eriophyes triradiatus Nal.	*Salix* spp.	- forming proliferations in a shape of witch broom, globular shaped.	- proliferation necrosis; - they wither and remain on the branches from one year to the next; -unaesthetic aspect of the plants.
Polyphagotarsonemus latus Banks	*Impatiens* spp.	- distorted growth of the plats; - twisting and decrease of the growing peaks; - abnormal or no lack flowers; - short internodes and stunted plants with glassy appearance.	- ornamental value of the plants is much decreased.
Schizotetranychus (*Stigmeopsis*) *celarius* Banks	*Phyllostachys aureosulcata*	- white web, in the shape of a nest, on lower side of leaves.	- leaves with variegated aspect, they will wither with time.

Table 2. Manifestation of the mites attack at *Tilia* genus in the period of 2008 – 2011

Mite	**Host plant**	**Frequency of the attacked plants (%)**				**Intensity of the attack (%)**			
		2008	2009	2010	2011	2008	2009	2010	2011
Eotetranychus tiliarium Hermann	*Tilia cordata*	90,69	81,39	75,58	82,12	92,50	76,00	34,25	90,24
Eriophyes tiliae tiliae Pgst.	*Tilia platyphyllos*	56,00	40,00	68,00	54,00	6,32	8,32	6,12	6,08
	Tilia cordata	15,11	30,23	17,44	20,42	0,65	0,23	0,12	0,15
	Tilia tomentosa	93,52	89,20	96,40	90,34	28,98	5,48	16,14	14,56
Eriophyes tiliae rudis Nal.	*Tilia tomentosa*	44,60	43,16	38,84	40,26	22,04	12,64	13,83	14,20
Eriophyes tiliae exilis Nal.	*Tilia platyphyllos*	16,00	8,00	12,00	10,00	1,22	1,49	1,08	1,28
	Tilia cordata	2,32	4,65	1,16	2,50	0,20	0,80	0,12	0,44

Photo 2. *Eriophyes tiliae tiliae* on *Tilia tomentosa*

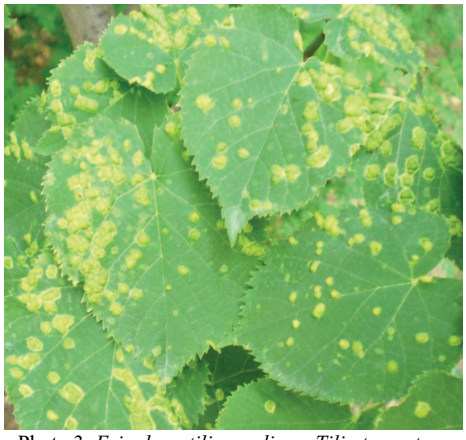

Photo 3. *Eriophyes tiliae rudis on Tilia tomentosa*

Eriophyes triradiatus Nal. was found on *Salix babylonica* (Photo 4) and *S. matsudana* "*Tortuosa"* (Photo 5).

Photo 4. *Eriophyes triradiatus* on *Salix babylonica*

Photo 5. *Eriophyes triradiatus* on *Salix matsudana "tortuosa"*

The attack is associated withe the forming of witch brooms with a globular shaped. These turn brown, wither and remain on the branches from one year to the next, reducing the ornamental value of the plants.

Polyphagotarsonemus latus Banks has been sporadically observed on the plants of *Impatiens* spp. placed in urban areas. Their infestation happened in the breeding spaces and the attack manifestated itself in the planting place. These plants lost their ornamental value in a little while and they needed to be replaced.

Schizotetranychus (*Stigmeopsis*) *celarius* Banks can be a new pest for Romania, that entered the country together with the host plant *Phyllostachys aureosulcata. Stigmeopsis celarius* was described in 1971 by Banks, it was renamed *Schizotetranychus celarius* by McGregor in 1950 [1] and recently returned again to *Stigmeopsis celarius*. Today it is considered that *S. celarius* is a complex mites, several species being identified: S. *celarius* Banks., *S. miscanthus* Saito, and *S. longus* Saito [6, 7]. This species form colonies on the lower part of the leaf in the guise of a delicate white cobweb and with an almost round shape (Photo 6). In general the mites stay under the formed cobweb where they feed and deposit eggs. Here there can also be observed black excrements. A part of the adults and larvas leave the web and form new nests. On a leaf can be seen an average of 80 individuals. The leaves have a variegated aspect (Photo 7) and they will wither

with time on. The attack of this species has manifested in 2008 and 2009 but it hasn't been present in 2010 and 2011.

Photo 6. *Schizotetranychus celarius* on *Phyllostachys aureosulcata* (white web, in the shape of a nest)

Photo 7. *Schizotetranychus celarius* on *Phyllostachys aureosulcata* (leaves with variegated aspect)

CONCLUSIONS

The possibilities to control these species are limited, taking into account the location of the plants (parks, public spaces, playgrounds for children, places for rest and relaxation, isolated trees, alignment trees, private gardens, size of the trees), the lack of pesticides with low toxicity or of biological control agents, the application difficulties and the costs of these treatments.

The difficulties of pest control are worsening by the urban environment in which the ornamental plants are placed. Thus, the pest control management is based on a series of components like: the identification of the pest centre; the types of harm and the intensity of the attack; the decision on different levels concerning the control methods; the identification of the key pests; promoting a natural pest control system; researches concerning the fighting strategy and methods; the characteristics of the pest control equipments; establishing the frequency of the treatments; the climatic conditions; the presence of water (lakes, ponds, flowing waters) in the landscape arrangements; the costs of the pest control treatments and the financial sources with this destination; the restrictions concerning the use of chemical products in the urban environment; minimizing the negative impact of pesticides over the environment; the training degree of the administrative personnel; communication with the public; communication inside the system and the political decision.

Prevention and control the pest from the urban areas implies the application of a group of integrated measures, like: cultural, technological, biological and chemical.

The cultural and technological measures consist of: choosing the flowers in the moment of setting up the verdure spots according to their decorative value, but also according to the ecological requests, in order to obtain strong plants, resistant to pests' attack; cutting the trees and bushes in order to ensure an airy leafage; cutting the dried branches; obliteration of the fallen leaves; wetting and fertilization of the plants; wetting the plants through aspersion in order to reduce the attack of mites and of

several species of insects. The chemical control can be used restrictively: using chemical products from the use of products accepted in ecological horticulture; the use of selective products; injection of the trees in order to minimize the negative effects.

Several ornamental plants have been investigated from parks and verdure spots of north Bucharest and tetranychid, eriophyid and tarsonemid mites have been discovered.

The unaesthetic impact of the yellow and grey trees on the streets, in the parks and gardens during summer months increases considerably the public interest towards these pests.

The control measures are necessary for the following species: *Tetranychus urticae* Koch., *Eotetranychus tiliarium* Hermann, *Polyphagotarsonemus latus* Banks and *Schizotetranychus* (*Stigmeopsis*) *celarius* Bank.

The difficulties to fight them depend on a series of factors like: the emplacement of the trees (street, verdure spot, private garden), the configuration of the trees (isolated, in group or in alignment), covered soil, the height of the trees etc. Also the presence of these pests in the urban areas calls for a minimizing of the chemical methods used to fight the pests.

The restriction of the pests' attack from the parks and decorative gardens is based on the application of a group of integrated measures, like: cultural, technological, biological and chemical methods. The plants infested with eriophyid mites present in general a good vegetation state and application of treatments is not necessary. The pest control management in parks and decorative gardens is influenced by the urban environment.

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