Preliminary study regarding the healthy state of some decorative trees from the University and N. Balcescu Parks of Oradea

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Abstract. During the present study we wanted to evaluate the diseases and pests of the ornamental tree species from University and Balcescu parks. From these two parks we have collected samples in three periods of the year – may, June and September. The samples consist from attacked leaves of 16 species of ornamental tree and shrub species. On the leaves collected in May we observed the presence of some attacks in the shape of small blurs or orifices. In June we have noticed the increase of the number of blurs and their dimensions were bigger. In September the blurs are more confluent covering almost the whole leaf. The attacked leaves roll up and they fall early. We determined a number of 7 types of diseases produced by bacteria, fungi or insects.

Introduction

The subject of the research consists on the study of the healthy state of some decorative trees from two parks of Oradea city.

The study is based on the identification of the pathogenic agents which affects the leaves of the trees.

There are two types of agents capable to cause disease to the plants: abiotic and biotic. The abiotic agents are represented mostly by the pollutants and the high UV radiation in some periods of the year.

In specific condition physical factors of the environment, can have different harmful effects on the plants .These factors are : climate , edaphic , chemical and mechanic .

When the climate factors are crossing the limits , on exces or on minus , can harm the plants .The factors which are more often affects the plants are : dryness, frost , exces of atmosphere humidity, plenty of snow, dry or violent wind .

The edaphical factors can affects the plants when they are on exces or on minus. The edaphical factors ar : humidity, oxygen quantity, contents in nutritive or poisonous substances of the soil .

Harmful influence of the chemical type of factors are produced by the poisonous gases released on atmosphere or soil , by the corrosive action of the chemical substances used in pest control .

Mechanic factors, can cause wounds to the plants .This wounds can be made by human beings, animals or physical factors as the wind.

On the biotic class of agents they are many types of parasites: fungus , bacteria , virus , phytoplasma .

The fungus are parasite agents which affect more often the plants .The main way on which the fungus infects the plants is the direct penetration in the tissue , or also the infection can be started from the level of the natural wounds .

The bacteria infects the plants only trough the wound made by insects (after they feed with the leaves or with plant sap or made by physical factors) .The bacteria can not invade the tissue of healthy plants like fungus .

The phytoplasma infects the plant the same way as the bacteria . The difference between this two parasites is that the phytoplasma doesn't have a cell wall like bacteria .

The viruses are special pathogenic agents which affects the plants only trough the wound.

In the same group are included also the diseases produced by the insects.

The plants which are before affected by the abiotic factors are more predisposed to the biotic agents attack.

Unlike the abiotic agents the biotic are alive organisms and they can spread from one plant to another and because of this specific feature the number of the affected trees is increasing with time being the result of multiplication and migration of biotic agents.

Material and methods

The material on which the present work is based was collected during the month of May, June and September 2005 from the 2 parks of Oradea city, N.Balcescu and University.

During these 3 months I have collected affected leaves from 16 species of decorative trees and bushes.

The species from which I have collected leaves are presented in the Table number 1.

In the Bălcescu park the number of tree species is smaller than in the University park. This second park was conceived as a dendrological one so the number of plant species is higher here

Table 1. Studied trees species

N.Balcescu Park	University Park
Ulmus laevis	*Platanus X acerifolia (P.hybrida)*
Aesculus hippocastanum	*Morus alba*
Acer negundo	*Juglans regia*
Populus alba	*Phyladelphus coronarius*
Populus nigra	*Cydonia oblonga*
Tilia X europaea	*Prunus domestica*
Carpinus betulus	*Ailanthus altissima*
	Aesculus hippocastanum
	Acer negundo
	Tilia X europaea
	Fraxinus excelsior
	Euonymus europaeus

Results and Discussions

During the analysis of the collected material I have identified 7 disease and pathogenic agents on the leaves of 9 species of plants.

The results obtained after the analysis of the attacked plants is presented in Table number 2.

Table 2. Disease identified on the studied trees

Trees species	Pathogenic agent
Ulmus laevis	*Dothidella sp*
Morus alba	*Pseudomonas mori*
Juglans regia	*Microstroma juglandis* *Gnomonia leptostyla*
Phyladelphus coronarius	Attack by Coleoptera
Cydonia oblonga	*Gnomonia leptostyla*
Prunus domestica	Attack of Coleoptera
Ailanthus altissima	Attack of Coleoptera
Aesculus hippocastanum	*Cameraria ohridella*
Populus nigra	*Pemphigus spirothecae*
Tilia X europaea	*Eriophyes tiliae*

1. On the leaves of species of *Ulmus laevis* I identified the attack of *Dothidella sp*. In the month of September on the leaves I observed little and white spots disposed in groups and also it can be seen branches without leaves.

The pathogenic fungus is a parasite which is penetrating on the level of wounds and invaded the xylem vessels. (Eliade E., et al, Georgescu C. C.et al)

Figure 1. *Ulmus laevis* leaves attacked by *Dothidella* sp

2. For the species of *Morus alba* I have identified the bacteria *Pseudomonas mori*, the disease name is "mulberry bacteriosis". This disease was observed and described for the first time in Italy. In our days it can be found all over the world where *Morus* species are cultivated: Europe, Asia, South Africa, Australia, North America. (Georgescu et al., Lazar al. et al)

In our country this species was for the first time found in 1929.

In September on the affected leaves appear irregular, angular off-color spots which are growing in the diameter. A yellow area is surrounding the peripheral side of the spots. The young leaves affected are twisted and after a time they are falling down.

In time this bacteria can affect the young or older branches and also it can be seen on the trunk if the trees where the trunk bark is cracking and yellow fluid appear on the surface.

The bacteria penetration on the plant is made through stomata and through lenticels, and then it is localized in the vessels, in the nervures of the leaves and then is passed in the leave parenchyma.

The incubation period of the disease on the leaves is 2-6 days.

Figure 2. *Morus alba* leaf attacked by *Pseudomonas mori*

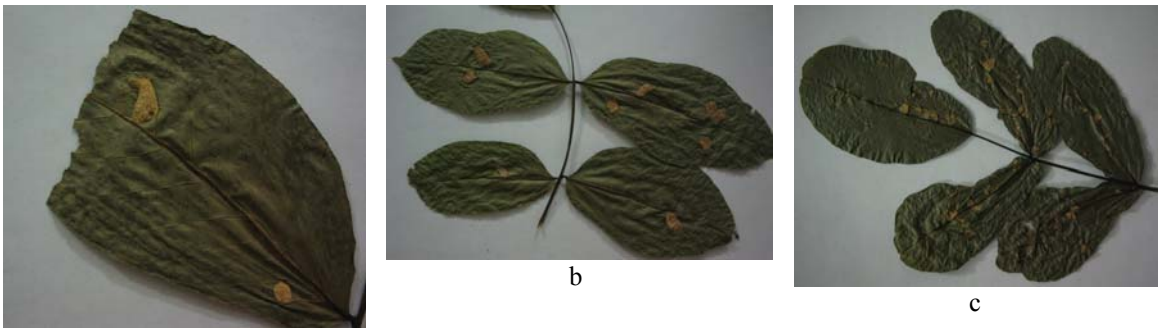
3. The leaves of the species *Juglans regia* were affected by the pathogenic fungus named *Microstroma juglandis.* In the 5th month of the year on the superior side of affected leaves appeared yellow and irregular spots disposed to lengthwise of the veins.

On the underneath side but in the same position like on the superior side of affected leaves appeared thin and yellow puffs which represent the fungus colonies of conidiophores with conidia. (Lazar al. et al, Savulescu O.)

After a time on the next crop it can be observe that the spots diameter is bigger and then also the number of spots increases. The fungus mycelium is molded in the intercellular spaces of the leaves tissues.

On the leaves of *Juglans regia* species it was also identified the attack of the fungus *Gnomonia leptostyla*. This fungus is frequently seen in or country and it is spreaded in all areas. In the month of July on the superior side of the affected leaves appeared brown spots of diameter between 2-5mm. After a time of incubation the spots join having a diameter of almost 2 cm. On the inferior side of the affected leaves appear fruiting bodies of the fungus like black points with an irregular arrangement. (Eliade E, Savulescu O).

The pathogenic fungus which affects the leaves in favourable condition can also affect the fruits. The affected fruits are little, they are blackening and after a time fall down.



a b c

Figure 3. *Juglans regia* leaves attacked by *Microstroma juglandis* (a – May, b – July, c –September)

Figure 4. *Juglans regia* leaves attacked by *Gnomonia leptostyla*

4. On the leaves of *Phyladelphus coronarius* it appears the attack of Coleoptera insects probably from the Family Curculionidae which damage by pierrcing the leaves.

Figure 5. *Phyladelphus coronarius* leaves attacked by Coleoptera

5. The leaves of the *Cydonia oblonga* were attacked by the fungus *Gnomonia leptostyla*. In July on the superior side of the affected leaves appear brown spots and on the inferior side in the centre of the spots it can be seen some little black points. In September the spots are covering almost the whole leaves surface. (Lazar al, Savulescu O).

6. On the leaves of *Prunus domestica* and *Ailanthus altissima* appear piercings made by Coleoptera from family Curculionidae. We didn't found the adult insects so we can't be sure of the species which caused the damage.

7. The leaves of *Aesculus hippocastanum* were affected by the microlepidopteran species *Cameraria ohridella*. This insect came in our country in 1996 from Macedonia through Timisoara. This lepidopteran has his origin in Asia. In Europe it was notified for the first time in Ohrid city (and hence named *ohridella*). The insect has speraded very fast in almost all Europe.(Perju & Olteanu).

In May on the affected leaves appear yellow-reddish spots lengthwise of the veins, and then the spots are conjugate.

The limbs of the leaves which were collected in September are more invaded by the spots, the leaves being on an advanced stage of alteration.

The insect is sheltered in a silky cocoon placed in the deteriorate mesophyll of the leaves. The attacked leaves and detached early from the branch.

8. In July on leaves petiole of *Populus nigra* it can be seen the galls form by the Homoptera species *Pemphigus spirothecae*. In September the galls are bigger in the diameter.

The galls are tumor-like grows which result from a localised proliferation process which can appear on different organs of the plant depending on the tropism of the galls producing organism. The development of the tumors in plants is the consequence of the modification of the genes function in the plant cells, this phenomenon is induced by some metabolits released by the parasite. These metabolits stimulate the synthesis of the phytohormones (auxins and cytokinins) they induce and modulate a new patern of cell differentiation. (Gerogescu C. C.)

a b

Figure 6. *Cydonia oblonga* leaves attacked by *Gnomonia leptostyla.* (a – July, b – September)

a b

Figure 7. Insects piercing on: a - *Prunus domestica* leaves, b- *Ailanthus altissima* leaves

a b c

Figure 8. *Cameraria ohridella* attack on *Aesculus hippocastanum* leaves (a – May, b – July, c – September)

a b

Figure 9. *Populus nigra* leaves attacked by *Pemphigus spirothecae* (a – July, b – September)

9. On the leaves of *Tilia X europaea* it was found the attack of *Eriophyes tiliae* mite.

Eriophyes mites are plant parasites forming various galls on foliage or other parts of their hosts which may cause physiological dysfunction of the infected parts of the host plant.

The galls are caused by microscopic mites who secrete chemicals into the underside of the leaves whilst feeding. The chemical cause the tissue cells to grow abnormally.(http://chrisraper.org.uk/Galls/, http://www.rhs.org.uk/advice/profiles0704/lime_nail_gall_mite.asp, http://www.aie.org.uk/trunkline/pests/aie_pd_nail.html)

Figure 10. *Tilia X europaea* leaves with *Eriophyes tiliae* mite galls.

Conclusions

After the analysis of results of the attacked plants we can observe that in the favourable condition the stimulation of settlement, development and breeding of the parasite species in an environment lacking phytophagous concurents and biological factors of regulation.

The predator species are absent in the period when the pathogen agents are settling on the plants so they multiplicate very fast and comprise the whole plant causing the massive falling of the leaves on many trees of the urban parks.

We can notice a progressive evolution of the most pathogen agents from the spring period to the autumn.

On the leaves collected from the affected trees I identified:

- 5 species were attacked by pests from insects group (Coleoptera,Lepidoptere and Afidina)
- 3 species attacked by fungus
- 1 species attacked by bacteria

Also we have noticed that is an increased number of pathogen agents in the University park where the trees are not treated with insecticides.

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