

# Leaf Blister Mites (*Eriophyes* sp.) as Significant Pests in Orchards

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**Abstract:** Orchards constitute a place to live for different pests. Leaf blister mites belong to the family of eriophyoid mites and they can have significant economic meaning in fruit production. These are not free-living organisms and the majority of life they spend sheltered in blisters or under the bud scales, where they overwinter. In spring overwintered females leave the swelling buds and start to feed. In result of their feeding appear small blistered galls inside which females lay eggs. When the trees are numerously infested by leaf blister mites both efficiency of photosynthesis and vigor are significantly reduced, what directly influences on the yield of fruit. These pests can be effectively controlled only in such moments when they appear on the surface on plants, so it is particularly necessary to follow the deadlines in case of control leaf blister mites.

**Key words:** orchards, leaf blister mites, pests, galls, control

## 1. Introduction

In many countries within the Europe and in other continents fruit production is highly developed and constitutes an important branch of economy. Orchards in which are grown different species and cultivars of fruit trees cover a huge area counted in thousands of square kilometers. Fruit trees are a place of living for some kinds of pests. One of the groups of pests infesting fruit trees constitute the superfamily of eriophyoid mites (Acari: Eriophyoidea). These are very tiny organisms and it is almost impossible to observe them by naked eye, without using any microscopic device. Eriophyoid mites are obligate phytophagous organisms and in majority exhibit a high level of host specificity and adaptability. They are able to inhabit practically all the parts of plants apart from roots. Many species of eriophyoid mites are considered economically important because of certain damage like

spots, galls, rusetting, browning, stunting or rolling the leaf edges, which they are able to cause. Several species can also transmit phytopathogenic viruses [1, 2].

Leaf blister mites (*Eriophyes* sp.) are a genus inside the eriophyoid mites. These mites attack such plants like pear, apple or quince, but also can occur on other species of plants from the family Roseaceae, like mountain ash or hawthorn. In literature as significant pests are mentioned especially pear leaf blister mite (*Eriophyes pyri* Pagenstecher, 1857) and apple leaf blister mite (*Eriophyes mali* Nalepa, 1926). To the genus *Eriophyes* belongs also *Eriophyes sorbi* Canestrini, 1890 which infests mountain ash. Some scientists even suppose that pear leaf blister mite and *Eriophyes sorbi* may potentially constitute one species because of numerous similarities, but it is still not explained. The average body length at leaf blister mites is less than 0.3 mm. The same like other eriophyoid mites, they have got only two pairs of legs. The body is worm-shaped, what differs leaf blister mites from for example pear rust mite (*Epitrimerus pyri* Nalepa, 1898)

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coexisting with them on pear trees. Leaf blister mites are usually bright coloured. The most often are observed whitish specimens, but some of them can be tinged with pale brown. Specific symptom of their presence are small blistered galls [3, 4].

Numerous population of leaf blister mites infesting the trees is able to cause serious damage, but when the population of mites is not large, plants can well tolerate it and in such case it does not have especial impact both on the yield fruit [5]. The majority of life they spend hidden what effectively protect them from the impact of many plant protection products. Only for a short time, especially in spring, they are present on the surface of plants, what means that in case of controlling these pests it is particularly important to follow the deadlines [6, 7].

## 2. Biology

Leaf blister mites do not belong to the free-living mites and majority of their life spend they in blisters or in buds. Only for a short time they leave these places. Their life cycle is the same like at other eriophyoid mites and consists of four stages: e.g., larva, nymph and adult. Nymphal stage is similar to the adult specimen but is a bit smaller. During the year can usually occur two or three generations [8, 9].

Leaf blister mites spend the winter in a semi-active state under the bud scales. Almost the whole overwintering populations constitute females, within such populations there are hardly some males. When the temperature permits, they carry on the feeding and breeding activities [10]. In spring when the buds swell mites become active, leave the buds and start to feed. In result of their feeding appear small blistered galls. After 1-2 weeks females begin to form small holes in blisters through which they enter and lay eggs inside these blisters. Usually only one female enters to one blister and each female is able to produce 7-21 eggs, so the reproductive potential is high [6, 9].

Usually the development of specimens of leaf blister mites within one generation lasts quite shortly, because

only 20-30 days are required to go from egg to the adult stage. Their whole life cycle takes a place inside the blisters caused by feeding overwintered females. Mites belonging to the next generations can move out of the blisters and create new blisters and set up colonies on other nearby developing leaves. It may be observed especially in case when populations of mites are very numerous and the existing blisters become overcrowded. Apart from it eriophyoid mites are such small organisms that they can expand being transmitted by wind [3].

## 3. Harmfulness and Methods of Control

Leaf blister mites belong to the significant economic pests in orchards. The size of damage caused by them depends not only on atmospheric factors, but also on other factors like cultivar, place of setting the plantation and the presence of natural enemies. The symptoms of infestation of leaf blister mites are very clearly noticeable. Leaves developed in spring from the buds in which mites were overwintering may by often deformed [7]. Mites feeding on leaves invade the mesophyll and create small galls having a blistered structure (Fig. 1; Fig. 2). At the beginning they are greenish or slightly yellowish. After short time they become darker and change their colour into pinkish. Especially on pear trees is noticeable, that the blisters change the colour very fast. Finally after some time they turn necrotic and brown or blackish. When the occurrence of mites is very intensive and there is



**Fig. 1** Symptoms on apple. (<http://utahpests.usu.edu>)



**Fig. 2** Symptoms on pear.

especially a lot of blisters, they can join together into bigger ones and cover a substantial part of leaves. It significantly reduce both the photosynthesis efficiency and plant vigor and even can lead to the partial leaf fall during the summer, what may be especially observed during August. The final consequence is a strong decline of yield [4, 6].

Not only leaves can be attacked by leaf blister mites. They can cause forming the blisters either on the top parts of branches and on flower buds. Mites can also infest fruit at the time of blooming and feed on them. In consequence on the skin of fruit appear symptoms like scarring and russet, which are quite similar to the symptoms of apple scab disease caused by fungus *Venturia inaequalis*. The commercial value of such fruit is lower [3].

The significant influence on the degree of damage caused by leaf blister mites has got the cultivar of fruit tree. Some cultivars show bigger resistance and tolerance on such kind of pests. Badowska-Czubik et al. (2014) [11] carried out the experiment in which six cultivars of pear were examined regarding to the impact of pear leaf blister mite. This experiment showed that the cultivars “Erika”, “Amfora” and “Faworytka” are distinctly more susceptible for the damage caused by leaf blister mites than the cultivars

“Concorde”, “Konferencja” and “Radana”. In June 2011 it was noticed that over 70% of the leaves on the cultivars “Erika”, “Amfora” and “Faworytka” were damaged whereas on the rest of the cultivars such a huge percentage of infested leaves was not observed.

Leaf blister mites belong to the economically significant pests and in comfortable conditions they can constitute a real threat. Unfortunately dealing with a problem of them is quite a difficult task. The possibilities of their control are limited because of the fact, that like all the gall mites they appear on the surface of plants very rarely. Chemical protection from these pests is mostly inefficient, because the chemicals can usually control the pests only on the surface of plants [12]. In UE countries from the beginning of 2014 is required to apply integrated plant protection and according to it leaf blister mites the same like other pests must be controlled with a priority of using methods alternative to chemicals. Very important is prevention. Newly setting orchards should be enough isolated from these places where the symptoms of occurrence of leaf blister mites were observed. Apart from that all the principals connected with fertilizing and other agrotechnical aspects should be followed. Referring to the results of research important matter is to choose the cultivars showing higher degree of resistance on leaf blister mites and what is more the growing material should be free of mites and any pests. As a biological control can be used biopreparates containing such predatory organisms like mite *Typhlodromus pyri* Scheuten, 1857 which belongs to the phytoseiid mites. The research showed that this biocontrol agent is efficient in controlling leaf blister mites in orchards. Moreover, *T. pyri* is able to survive and reproduce on the alternative food sources like fungi, pollen or plant juices, so the treatment with this mite is not necessary to be so often repeated [13].

Chemical control is possible to be carried out only in a period before forming the blisters, otherwise it will be not efficient [13]. It was showed that satisfying effects can bring pesticides containing sulphur. Against leaf

blister mites also mineral oil was tested and even if that significantly reduced the population of mites, there was still quite a lot of young fruit damaged. It means that the efficiency of using mineral oil is usually lower in comparison to the sulphur but both of them can be applied [6].

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