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About Actinedid Mites (Acarisformes: Actinedida) of Vineyards in Azerbaijan (Ganja – Gazakh Region)

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ABSTRACT

The paper gives information on the composition, nutrition and bioecological features of the actinedid mites, which are damaging grape areas of the Ganja-Gazakh region and villages. In 2016-2017, 22 species of mites belonging to 4 families, 13 genera have been studied, of which 2 species—*Brevipalpus phoenicis*, *Brevipalpus chilensis* are noted for the first time in Azerbaijan's fauna.

KEYWORDS: Mite, Vineyard, Damage, Nutrition, Bioecological features.

INTRODUCTION

As a result of the researches conducted in the district and villages of the surveyed region, the actinedide mites that deteriorate all surface parts of the grape were found along with other pests during defining of pests. Loss of crops has been rising with a huge increase in these mites since the beginning of the year, and the quality is being diminished, and the plant is gradually disappearing.

Investigations were carried out in vineyard of Ganja - Gazakh region and villages, in the yard areas (Ganja, Agstafa, Gazakh, Shamkir), samples were collected and analyzed. The article is devoted to 23 species of actinedide mites belonging to 13 genera and 4 families (Tetranychidae, Bryobiidae, Tenuipalpidae, Eriophyidae) that increasing on a living position in the vineyard with a wide range of infections, differs from each other with various life styles, nutrition and biological characteristics, increasing on a living position in the vineyard and a wide range of infections. Three species are mentioned for the first time in Azerbaijan fauna.

MATERIALS AND METHODS

The collection, processing of the materials was carried out in field and laboratory conditions by general accepted arachnological methods [1].

MBS-1 and MBS-9 microscope, FOR solution, TC-80M thermostat and thermometry have been used to determine the collected mites.

RESULTS AND DISCUSSION

Family: Tetranychidae Donnadieu, 1875

Genus: Tetranychus Dyfour, 1832

Tetranychus turkestanii (Ugarov et Nikolski, 1937) – is polyphagous. It is found everywhere in Azerbaijan. It infects the cotton, grapes, fruit trees, berries and vegetables. The infected leaves covered thick narrow turn pale and dry out.

Summer females with egg-shaped body also absorb chlorophyll together with cell sap during nutrition. Therefore, their common colors are greenish and their stain is black. But in wintering females are reddish. There is a rhombic figure formed from skin wrinkles on the back side of the body. Males are differed from females by body size [2]. Reproductions are sexually, but they can breed in partenogenetic ways too.

Fertilized females are hibernated in small bumpy colonies under the trees, in the grass and other plant residues, in the cracks of the shells. They put eggs in the form of globe-shaped. The diameter of these eggs is about 0.13 mm. The newly egg becomes transparent. After a while it becomes stained yellow color [3].

The larvae that come out of the ovary are rounded with 3 pairs of feet. Their length is 0.19 mm on average. They are initially colorless, and after nutrition, they become pale green color.

It is increasing in Azerbaijan conditions from early April to early August. The development of each generation takes 20 to 33 days, depending on the temperature.

Tetranychus urticae **Koch, 1836**– is cosmopolitan as well as polyphagous. They damage the tissue of the grape leaf by giving special action to the needles of the chelicerae. They suck cellular sap through the oral stilet (piercing organ) and the gullet tube. The brown spots are formed on the infected leaf. After a while, these spots cover the entire surface of the leaf by merging and gradually cause it to fall. The number of mites reaches the maximum in June – July [4].

Tetranychus viennensis **Zacher, 1920**- hawthorn mite is found everywhere. Fruit trees and grape leaves are infected. Infected leaves with mites in a colony are yellowish, edges are folded inside and the surface is covering with thick narrow. Such foliage dries early and it is poured [2].

Egg-shaped body is dark red. Its egg is spherical, transparent. After a while, it becomes the greenish pink color and is hanging from the web. These species, which essentially contain from 2 to 10 eggs, are massively increased by large colonies, depending on temperature. The mite, which cause more damage in the second half of the summer gives up to 7 generations in a year.

Genus: Panonychus Yokoyama, 1929

Panonychus ulmi (**C. L. Coch, 1836**)- European red mite is widely spread throughout Azerbaijan. It is polyphagous. It pierces the epidermis on the lower surface of the leaf, infecting the fertile, cedar fruit trees, decorative plants, and the leaves of the grape vines and it begins to take cell sap. The appearance of a light yellow spot on the lower surface of the leaves is one of the first symptoms of the infection. After a while the leaves get grayish brown color. Eggs hibernate. Reproduces sexually and in partenogenetic way. Develops by an incomplete metamorphosis. It provides 5-6 generations a year. The body shape of the average sized mite is oval as in all narrow ticks. The mouth apparatus is in piercing-sucking form. The body of the females is about 0.4 and the males are about 0.3 mm. Eggs in red color are placed on the offshoots, where the branches are stacked (being once-twice a day, sometimes 3-4 pieces).

The laying of winter eggs that reached to total number of 60-90, and sometimes up to 150 is lasting to 2-3 months, and the process continues until the end of the fall. The branch or offshoot appears as stained red according to putting as 2-3 layers of the cold-resistant winter eggs. The larvae begin to emerge and feed themselves when young leaves formed in the branch and trunk [5].

In general, the most dangerous time of leaves infection with mites coincides with summer.

Schizotetranychus pruni (**Oudemans, 1931**)- The widely spread garden mite is polyphagous. It leaks on the substrate by damaging leaves of apples, plums, cherries, pears, grapes, apricots, etc., squeeze the epidermis and parenchyma, and sucks cell membranes. First the leaves become discolored through the lateral and central veins, and then change their color to the brown and fell out by drifting.

Adult females of the mite are hibernating in the cracks of the bark, under healthy barks and fallen leaves with mass. The hibernating penetrates into the newly opened leaves in spring, when the shoots are expelled. They suck their saps through the mouth apparatus passing from there, gradually to the young leaves. These mites live there and develop by spreading a spider web at the bottom of the leaf. When they suck leaf sap, the chlorophyll grains of these leaves break down, the water decreases, the photosynthesis process weakens, the respiratory accelerate the amount of the proteins decrease [6].

The yellow spot forms on the infected leaves of white grape varieties and red grape varieties produce dirty red spots.

The fertilized female individuals put their eggs alone over the spreading net, which is on the lower surface of the leaves, after a little nourishment in spring. These eggs are smooth, spherical. First, the color is transparent, and after a while it becomes a little blurred. Round, colorless larvae begin to emerge from these eggs. This process takes 5-6 days.

The color of the oval-shaped larvae, which have 3 pairs of feet, change after the feeding. The size of the mature mites is 0.3-0.6 mm. The body of the females is oval, covered with a soft and transparent cover. Summer females are greenish, and winter females are pink-red or dark yellow. The dorsal bristles are needle-shaped. The body of the males is oblong.

These mites develop with incomplete metamorphosis. Their development requires a temperature of 25-30°C. They reproduce sexually. The fermented females hibernate. It is possible to collect them with the trap belts.

The infection of grape varieties with these mites depends on the density of hairs on their leaves. Namely, grape varieties with medium and weakly fluffy leaves are more likely to get mites. Because the pests spread nets by moving between the fluffies and can live normally. They can't spread net in grape varieties with tight fluffy or without fluffy leaves and therefore can be underdeveloped.

Shizotetranychus viticola **Reck, 1956**- is a narrow mite of grape. They are found everywhere of grape areas. Mature females hibernate among the barks of grapevine, in the cracks. They are being appeared in the green parts of grape in early of April and inflect on young leaves when the initial leaves appear, their sap is being suck. They put their eggs there, on the lower surface, because there is a lot of sap and other nutrients on young leaves. Consequently, the amount of water, chlorophyll decrease, photosynthesis breaches, breathing gets hard. These leaves are gradually ossifying and disappearing.

The mass reproduction, growth of these pets depends on grape sorts, as well as weather.

Schizotetranychus carpini (**Oudemans, 1905**) – has been widely spread in Oghuz, Shamakhi, Khanlar regions, Absheron peninsula of Azerbaijan. This species that basically damages plum, cherry, blackthorn and grape has been investigated in grape gardens of Shamkir region. It gives 5-6 generations in a year. Females put eggs over the bark of offshoots and branches in several rows with mass. Mainly, they hibernate in the egg period. Winter eggs are high cold-resistant [7].

Genus: *Oliqonychus* Berleze, 1913

Oliqonychus caucasicus (**Reck, 1956**) - this species has been found in hazel and grape in Guba, Gusar regions and Absheron peninsula of Azerbaijan[2]. We gather this species from leaves of "Izabella" grape sort in the yard area in Poylu village of Aghstafa district.

Family Bryobiidae Berlese, 1913

Genus: *Bryobia* Koch, 1836

Bryobia redikorzevi **Reck, 1917**- Almost orchards make a condition for high infection of this species on grape because of near grape areas and sometimes the growth of fruit trees in grape areas. The grape is also considered to be a main shelter for hibernating of this pest and they hibernate among old barks of grapevine. Therefore, the spread area of this mite is larger than other species and damage strictly [2].

This species differs from other tetranichid mites with frontal protuberance, the change on leave during outbreak and they distinguish from other mites with dark green color, sometimes brown color. The oval-shaped females are being developed in a partenogenetic method. Their light red eggs are ball-shaped. Larvae are yellowish oval-shaped. There isn't frontal protuberance. Nymph looks like adult with all features. First generation develops completely at the end of April. June-July months are period of intensive reproduction and the most harmfulness of mite depending on temperature. This species that increase in number from May till July is large polyphagous.

Bryobia rubrioculus (Scheuten, 1857) - brown fruit mite has spread everywhere of Azerbaijan. It is considered dangerous pest of fruit trees, pomegranate and grape, berries. The eggs put under the old barks and cracks, place of forked branches. The branches with egg appear reddish-brown color because of being such color [8].

It hibernates in the period of egg. The over of winter egg is covering with fluffy unlike summer egg. They can be hard cold-resistant because of this feature. The amount of brown fruit mite that gives 4-5 generations during a year arranges depending on climate.

Genus: *Petrobia* Murray, 1877

Petrobia latens (**Müller, 1776**) - is large polyphagous. It is found in various grass and trees, bushes. We gather this species, found over the grass in Khackmaz, on the different sorts of grape leaves in yard area of Garapapaq, Musakoy villages of Gazakh and Poylu, Tatli villages of Aghstafa.

Family Tenuipalpidae (Berlese, 1913), Sayed, 1950.

Flat-shaped mites are very close to spider mites. Therefore, they are sometimes called “false spider mites”. The main anatomical difference of this group is that the body of spider mites is not shared, whereas the body of flat mites is shared on some parts with transparent stitches. At the same time, the color of egg is different as bodies. Mainly, the species of *Brevipalpus*, *Hystripalpus*, *Tenuipalpus* genera have largely been spread. They are seen only under the microscope, because of very small size.

Genus: *Brevipalpus* Dennadien, 1875

Brevipalpus phoenicis **Geijske, 1939** – is very small. The length of body is from 0,25 to 0.4 mm, it is ovoid, black color, its small part is red striped. It damages citrus, tea, nut and grape.

The body of females is ovoid, length is 0.33 mm, width is 0,18 mm. Male is smaller than female. The eggs are oblong red- orange, larvae are also red. It is heat-loving species.

They don't excrete web. Their signs are that the infected leaves are turning pale slowly and gradually disappeared. Therefore, they are very dangerous, they can multiply at a simple room temperature easily all year around. These mites are very light, therefore the wind can spread them. It is gathered from grape leave and found in Azerbaijan's fauna for first time.

Brevipalpus chilensis **Baker, 1949** – this species is noted for first time in Azerbaijan and considers as a serious pest of grape, apple, citrus, mallow and other plants. Duyerli village of Shamkir region is the place where the material collected.

The mite is brick-red color, but over is brown striped. The body is oblong. They have been divided as if 3- front, mid, back (gnathosoma, opisthosoma, hysterosoma) parts. They are very small. They have a strong disconnected chitinized cover. They have 4 pairs of legs. Every female individual lays egg in certain amount. Females coming from hibernation leak to young leaves and buds to feed in a blooming period, suck cell sap. There are small holes on the surface of such leaves. The decorative significance of sick plants disappears, blooming is decreasing, and lower leaves are turning pale. When we look attentively, small, greasy shine gets attention through the vein on the lower surface of leaf. Upper part is getting brown. Weakened leaf and flowers turn pale and drop. It gradually causes the loss of product.

Brevipalpus obovatus **Donnadieu, 1875** - this species is found everywhere of Azerbaijan. It is polyphagous. It infects citrus, pomegranate, pear, currant, cranberry etc. It is pink-red color, it infects main generative organs. It mentions as a dangerous pest. It is interesting that they hibernate in the all periods of development. It gives 5 generations in a year.

Genus: *Hystripalpus* Mitrofanov, 1973

Hystripalpus lewisi (**Mc.Gregor, 1949**) - has been spread Aghdash, Guba, Aghstafa, Shamkir regions and Absheron peninsula of Azerbaijan, it is polyphagous. It is considered as a dangerous pest of citrus, grape, pomegranate, rose, other plants. They hibernate in the cracks of barks, under the dried bark in a colony. In summer females getting out of place leak to lower surface of young leaves, feed and lay an egg. Their movements are weak.

Cenopalpus mespili **Livshitz et Mitrofanov, 1967**- this species, collect in Shamkir, Aghstafa and Ganja, damages medlar, apple, grape, hawthorn, cranberry, cherry, quince etc. Fertilized females hibernate in the scales of buds, trunk and cracks of barks of branches. Wintering mites are scattering over the trunk and branches in such a tight condition, the same branches appear in full red color.

This species is polyphagous, it is noticed by Zapletina V.P on grape in Tovuz region for the first time.

Genus: *Cenopalpus* Pritch. et Baker, 1958

Cenopalpus pulcher (**Canestrini et Fanzaqo, 1876**)- is found in apple, quince, pear, plum, as well as grapevine, cranberry, hazel etc. It infects mainly apple, pear, and quince. It gives 4 generations during a year. Fertilized females hibernate in small colonies among the scales of buds, in the cracks of barks of branches, in the 3 parts of branches.

Genus: *Aequiptalpus* Mitrofanov, 1973

Aequiptalpus granati (**Sayed, 1946**)– It is oligophagous. It has spread in most regions of Azerbaijan and in Absheron peninsula. Adult females of this species hibernate on the branches, they are considered as a dangerous pest by damaging quince, grape, and pomegranate.

Family Eriophyidae Nalepa, 1898**Genus:** Eriophyes Siebold, 1850

Eriophyes vitis (**Pagenstecher, 1857**)– The wide spread grape felt mite monophagus. It is found at all regions in grape areas, it is small size, and its simple eyes are not seen.

The body is worm-shaped, color is white or yellowish. It has 2 pairs of legs. These mites are found only on the grape. It starts to feed in the period of opening of bud. Deutogenous females hibernate in external scales and on the basics of buds. They create small knobs in the lower side of leaves out of the winter nets in summer at the beginning May, when the initial leaves of grapevine created. There are rags in upper surface of such leaves, but in lower side has basements according to rags. At first time, inside of knobs are white, then cover with yellowish fluffies. These fluffies in such knobs remind “felt” and the name of mite was taken here. The knobs that mite created are situated in lower surface of leaves a lot. As the leaf grows, the knobs dried up, crack and mites move to the small leaves that opened newly. This process lasts along summer. Mainly it is dangerous for leaves of young plants. Because their normal nutrition and development is possible only in young leaves.

All mites gather three places of branches of grapevine at the beginning of autumn. When the leaves begin to drop, the mites get out of knobs, move among the bud scales and hibernate there. These mites that multiplied during vegetation period can cause the loss of much production. It comes from that the infected leaves with felt mite get deformed form. The growth of offshoots that they located is getting weaken, they are thin and cranberry relatively plants. The number of bunches created on such offshoots is less and smaller [9].

Eriophyes vittigineusgemma **Maltshenkova, 1970**- The grape bud mite with odorous body structure damages mainly grape. It causes their damaging by feeding only inside of buds. Reproduces sexually.

The mites leak on new buds, start to feed and lay eggs by leaving hibernation place with high temperature in Azerbaijan (Ganja, Gazakh, Agstafa, Shamkir, Kurdemir, Jalilabad etc.) in spring (March-April). At this time, mites lay their eggs to mainly basics of leaves during the opening. They create rags similar to felt and scaly on it, as offshoot multiplies. 2-3 generations of mites develop under these rags [2].

The mites move to newly created eyes from the basic of offshoots till blooming of grape in May month and substantially damage to new buds by increasing there in a large amount. As the number of mites increases in new buds, they move to other buds over the offshoot. These mites give 5-10 generations in Azerbaijan's condition depending on climate. A large amount of infected buds with a mite is completely destroyed. The offshoots developed from buds infected by small number of mites are weak, leaves are small and yellowish. Consequently, the productivity decreases in grape areas.

Genus: Caleptrimerus Keifer, 1938

Caleptrimerus vitis **Keifer, 1938** – The grapevine leaf rust mite is a grape pest. This species is monophagous, it is investigated by Malchenkova in the grape gardens of Azerbaijan. It infects mainly grape leaves. Consequently, such leaves are deformed or white stains are formed on it. Highly infected leaves turn pale or blush. The period of fall is beginning earlier. The damage reaches maximum in spring. The reproduction is sexual. Deutogenous females hibernate. Mites give 5-11 generations on different sorts of grape.

The body of mite is yellowish, length is 0,15 mm. 6 or 7 pairs of awn are situated in this species in opisthosoma as other species of section. The subdorsal seta is exception. The body of leave mite of grape is getting thinner to the back side.

The wintered deutogenous females pass to active condition in 7-8°C. The mites begin to migrate to the leaves when buds opened. These buds don't usually open, or they multiply very slowly and they don't give fruit. This case starts in the middles of April. Mites direct to lower parts of offshoots in the era of migration and leak to new leaves. They gather in the surface of leaves along central vine intensively [9].

Fertilized females lay 7-15 eggs. The development of such eggs happens in lower surface of leaves. In autumn dethogen females are appearing in a mite colony. They go to hibernation at a low temperature (under the bark, places with cracks etc.). The number of generation depends on grape sort, where the mite lives. The spread area of this mite is very large, they are yellowish amber color.

Genus: Phyllocoptes Nalepa, 1889

Phyllocoptes vitis **Nalepa, 1905**- This species is monophagus, it investigated by Malchencova. They are gathered in a small colony at lower surface of grape leaves. They feed along the central vein by sucking the cells of leaves. Consequently, damaged leaves become twisted, dropped.

Thus, based on aforementioned, it is possible to say that from 23 species of mite collected in a studied area 10 species are serious, 8 species are medium and 4 species are weak pests of vineyards in Azerbaijan.

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