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Plant protection activities in perennial plantations in August

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Except for powdery mildew on apple and peach, the danger from fungal diseases has almost passed. Damage from harmful insects and mites is also significantly reduced, as old leaves are not suitable for their development. Moreover, some of them migrate to their intermediate hosts.

Plant protection activities in August are aimed primarily at preserving the fruit harvest from worm infestation and the leaves from leaf-mining moths, bugs, and other pests that develop several generations. Monitor for mite damage, due to their proliferation.

Treatments must be aligned with the pre-harvest intervals of pesticides and the time of harvest. They should be carried out during the cooler hours of the day.

In orchards

All plantations are inspected for the detection of the fall webworm. If the economic injury level is exceeded, the crops are treated with DiPel 2X (100 g/ha).

The fall webworm (*Hyphantria cunea* Drury.) is distributed throughout the country. It has a multi-year population dynamics pattern (it multiplies massively every 5-6 years). It is a typical polyphagous pest, attacking over 240 plant species belonging to 47 botanical families. It prefers mulberry, apple, plum, cherry, quince, walnut, Norway maple, and ash among deciduous species.

In Bulgaria, the fall webworm typically develops two generations per year, and sometimes a partial third. It overwinters as a pupa under cracked bark on tree trunks, under roofs, or shallowly in the soil. Newly hatched caterpillars from one egg mass web several leaves together with silk threads and prepare a communal caterpillar nest, which they inhabit. The nest gradually expands along with their feeding and growth, encompassing the entire top part of the branch, and sometimes adjacent branches. Until the fifth instar (they usually have seven, but sometimes more), they live in the nest, which protects them from predators. After this instar, the caterpillars lead a solitary lifestyle. Their heavy hairiness protects them from predatory insects and birds.



Fall webworm (Hyphantria cunea Drury.)

Young caterpillars (in nests) skeletonize leaves partially, gnawing one epidermis and the parenchyma. Older ones skeletonize leaves coarsely, without affecting the veins, while the oldest ones consume the entire leaf blade. In the absence of food, caterpillars may also superficially gnaw the fruits. At higher densities, the pest can completely defoliate large trees over significant areas.

Moths of the second generation fly from early July to the end of August. Their fecundity is even greater (2500 eggs). Damage from hatched caterpillars is often even more extensive than the first generation, with a peak in August and early September.

After feeding, the caterpillars of this generation pupate and remain to overwinter. Some of the earlier pupated ones may emerge as a partial third generation, but it appears only in certain years and has a very low density.

Orchards attacked by the summer fruit tortrix moth should be sprayed with one of the following products - Delegate 250 WG (30 g/ha), Rapax 100-200 (ml/ha), DiPel DF 50-150 (g/ha), Avant 150 EC (33.3 ml/ha), Decis 100 EC (8.75-12.25 ml/ha), Coragen 20 SC (16-30 ml/ha). For mating disruption, you can also use combined pheromone dispensers - Isomate - CLR (100 pcs/ha).



Summer fruit tortrix moth (Adoxophyes orana Fisch.)

The summer fruit tortrix moth (*Adoxophyes orana* Fisch.) is found throughout the country. It prefers wetter and cooler regions. It is polyphagous and attacks fruit trees and some forest deciduous species. This leaf roller develops two generations per year. It overwinters as a young caterpillar of the second instar, housed in a silken cocoon on trunks, scaffold branches, and two- to three-year-old branches. Fed caterpillars pupate among leaves. Females lay their eggs on leaves. Average fecundity is 150 eggs.

The pupal period begins in July, and the flight of the second generation occurs in late July and during August.

Hatched caterpillars feed until early October - they gnaw the lower epidermis of leaves and make small holes in the fruits, gradually enlarging the damage, but the caterpillars do not penetrate deeper into the fruit flesh. The fruits do not drop, but they lose their commercial value. Then they move to overwintering sites and enter diapause.

Trunks and thick branches of fruit trees attacked by bark beetles should be treated with one of the following products - Decis 100 EC (12.25 ml/ha), Coragen 20 SC (30 ml/ha), Sumi Alpha 5 EC (0.03%), Karate Zeon 5 CS (15 ml/ha).

Peach orchards should be sprayed with one of the following products - Sulfur WG (600 g/ha), Solfo 80 WG (750 g/ha), Sistan 20 EW (0.03%), Luna Experience (50-75 ml/ha), Flint Max 75 WG (0.02%) against powdery mildew; with a deltamethrin-based product - Decis 100 EC (12.5 ml/ha), Meteor (90 ml/ha), Deka EC (50 ml/ha) against the oriental fruit moth, anarsia (third generation), mulberry scale, San Jose scale; and with Apollo 50 SC (40 g/ha), Valmek (60-96 ml/ha) or another abamectin-based product, Voliam Targo 063 SC (75 ml/ha), Naturalis (100-150 ml/ha) against mites.

The ascomycete fungus *Sphaerotheca pannosa* (Wallroth) Levelle var. *persicae* Woronichim, with conidial stage Oidium leuconium Desmazieres, the causal agent of peach powdery mildew, overwinters between the scales of attacked buds.

Local infection first appears on young growing fruits in the form of expanding powdery spots. Beneath them, the fruit flesh darkens, becomes woody, and very often cracks. Young fruitlets are susceptible to the disease up to a size of about 4 cm, after which they usually do not become infected. Often, less severely attacked fruits grow to harvest ripeness, but corky spots remain on them. In the second half of summer, numerous, most often angular, chlorotic spots form on leaves and shoot tips, covered on the underside with a powdery coating. Attacked leaves become severely deformed, and at high density, they necrotize and fall off.

Nectarine varieties show particularly high susceptibility to powdery mildew.

Powdery mildews on fruit species caused by pathogens from the genus Podosphaera

The disease develops over a wide temperature range, but with higher air humidity, although single infections are possible even under dry conditions. Frequent and intense rainfall is unfavorable for the development of powdery mildew, as it inhibits fungal growth and leads to the washing away of spores or their death.



Spore germination is stimulated by light, and diseased fruits are usually located on the higher southern or southwestern part of the tree crown

The peach twig borer (*Anarsia lineatella* Zell.) is distributed throughout the country. It prefers stone fruit species. It most severely attacks peach, apricot, and plum. It has been found on cherry, almond, sour cherry, and others.



Peach twig borer (Anarsia lineatella Zell.)

The insect develops three generations per year, and with a warm autumn, a fourth. It overwinters as a caterpillar of the second and more rarely the first instar in buds, in mummified fruits, in branch forks, on fruit stalks, and on the trunk. For overwintering, the caterpillar gnaws a small chamber with smooth walls, lined with silk threads. The chamber is most often located in the sun-exposed middle tiers of the crown. Usually, small piles of brown excrement accumulate around the overwintering site.

Moths of the third generation fly in August-September until October. They mainly damage shoots, but sometimes also attack fruits.



Caterpillar of the peach twig borer (Anarsia lineatella Zell.)

One caterpillar damages 1-2 shoots and/or one fruit. The length of the tunnel in shoots at this time ranges from 2-3 to 8-10 cm. Attacked shoots droop, and later their tips dry out along with the leaves, and their growth stops. In small fruitlets, caterpillars can destroy the entire interior, while in larger fruits, they gnaw a short tunnel in the fleshy part. The damage resembles that caused by fruit worms.

The mulberry scale (*Pseudaulacaspis pentagona* Targ.) attacks mulberry, peach, plum, cherry, almond, walnut, fig, horse chestnut, blackthorn, dogwood, cherry laurel, lilac, sophora, and others. Today it can be found throughout the country.

The scale insect develops 2-3 generations per year in our country. It overwinters as an adult, sexually immature female and as a nymph of male individuals.

A second generation appears in August, and a third - in September and October. The damage is identical to that of other armored scales - colonies formed on the wood cause necrosis of the cambial tissue under the bark and drying of branches. Red spots are observed on fruits.

Fallen worm-infested hazelnut fruits should be collected and destroyed.

Apple orchards should be treated with a pyrethroid insecticide - Decis 100 EC (7.5-12.5 ml/ha), Sumicidin 5 EC (0.02%), Afikar 100 EC (15 ml/ha), Efcymetrin 10 EC (15 ml/ha) and one of the following products - Apollo 50 SC (40 g/ha), Valmek (60-96 ml/ha) or another abamectin-based product, Voliam Targo 063 SC (75 ml/ha), Naturalis (100-150 ml/ha) against the apple leaf miner moth and mites, respectively. Against mite eggs and young larvae, when the economic injury level is exceeded, hormonal acaricides such as Nissorun 10 WP (75 g/ha) should be preferred.

The apple leaf miner moth (*Stigmella malella* Stt.) is found in all fruit-growing regions of the country, and sometimes its density is significant. It attacks only apple trees.

The apple leaf miner moth develops three to four generations per year. It overwinters as a pupa in the soil. Eggs are laid on the underside of leaves, near the veins. One female lays an average of 50 eggs. Embryonic development lasts from 6 to 11-12 days. Hatched caterpillars pierce the chorion at its attachment point to the substrate and enter the leaves without moving on the surface. The entrance hole is covered by the egg chorion. The caterpillars mine the leaves, gnawing snake-like curved tunnels directly beneath the upper epidermis, which gradually widen. The length of the mines in which caterpillars have completed their development ranges from 2.7 to 5 cm. Excrement is located in the middle of the mine, forming one wide or two longitudinal lines. Caterpillar feeding lasts from 12 to 26 days. After completing its development, the caterpillar gnaws a heart-shaped exit hole in the widened part of the mine, lowers itself on a silk thread, and pupates in the soil, at a depth of 5 to 7 cm, in a light brown cocoon. The pupal stage lasts from 6 to 13 days.

Due to the relatively high number of generations, the pest has the opportunity to multiply significantly. During the second half of the growing season, old and new mines from different generations accumulate on leaves. In case of severe infestation, over 20-30 mines can be observed on a single leaf. Leaves of heavily infested trees turn yellow and fall off as early as August, and fruits remain small and of poor quality. Trees lag in development, weaken, and set fewer fruit buds.

Pear orchards heavily infested with the common pear sucker and pear lace bug should be sprayed with a deltamethrin-based insecticide - Decis 100 EC (12.5 ml/ha), Meteor (90 ml/ha), Deka EC (50 ml/ha). This spray is also effective against the pear fruit moth.



The pear lace bug (*Stephanitis pyri* F.) is a widely distributed pest throughout the country. It attacks pear, apple, cherry, sour cherry, plum, chokeberry, rose, and other fruit species, as well as some ornamental tree and shrub species (cotoneaster, privet, etc.).

The pest develops two generations per year, and with a warm autumn, a partial third. It overwinters as an adult insect under fallen leaves and cracked bark. At the beginning of August, adults of the second generation appear. When the maximum daily temperature rises above 20 ^{0}C, they spread over leaves and begin sucking sap from their underside. While feeding, the bugs gradually cover it with watery excrement that hardens in the form of brown droplets. The upper side of the leaves acquires a mosaic (mottled) appearance due to the sucking of chlorophyll grains along with cell sap. Initially, the spots are few, but they gradually increase, and under severe infestation, they acquire a chlorotic appearance - turning partially or completely yellow and may fall prematurely. If exposed to the

sun, the process accelerates significantly, and damaged areas acquire a bronze tint. After copulation, females lay their eggs on the underside of leaves, inserting them at an angle into the parenchyma tissue and gluing them with a sticky fluid that hardens in the air. Average fecundity is 170 eggs. Larvae hatch after 20-25 days and feed in the same way on the underside of leaves.

Under severe infestation, leaves do not photosynthesize normally, turn completely yellow, and fall prematurely; fruits remain small, and trees become exhausted and set fewer fruit buds for the following year. Young trees and seedlings in nurseries and newly established orchards, where regular plant protection is not carried out, are particularly sensitive.

Chestnut trees should be sprayed against the chestnut weevil with Coragen 20 SC (18-30 ml/ha).

The chestnut weevil (*Curculio* (*Balaninus*) *elephas* Gyll.) is widespread. It damages cultivated chestnut and oak. It is found more abundantly in areas where chestnut plantations exist. This weevil species develops one generation per year. It overwinters as a larva in the soil, which pupates in June.

Beetles emerge to the surface in July. They feed by puncturing fruits, but this damage has no economic significance. Egg-laying begins only in August-September. Using their long rostrum, females lay from 1 to 20 eggs in a single fruit. Embryonic development lasts 2-3 weeks. Larvae feed on the interior of fruits, which become wormy and filled with excrement, gnawed remains, and shed larval skins.

After completing their development, they gnaw a round exit hole, leave the fruit, and go into the soil. There they prepare an earthen chamber at a depth of 7 to 40 cm, but most often around 15-25 cm, and remain in it until June-July of the following year.

In strawberry plantations

Strawberry plantations infested with the strawberry mite should be treated with one of the following products - Voliam Targo 063 SC (80 ml/ha), Laota, Bermectin, Valmek (15-100 ml/ha), Sulfur WG (500-700 g/ha), Heliosufre S (150-750 ml/ha).

The strawberry mite (*Tarsonemus pallidus* Banks. (*T. fragariae* Zimmerman)) is distributed in many regions where strawberries are grown. In addition to strawberries, it also damages many ornamental plants - cyclamen, chrysanthemum, begonia, petunia, gerbera, geranium, etc. It prefers wetter regions. The pest overwinters as a fertilized female in the surface soil layer, under plant debris, in leaf axils, and buds of strawberry plants.

Plant protection activities for strawberries in July

Depending on temperature conditions, one generation develops in 15 to 65 days. In one year, the pest develops about 7 overlapping generations, and at harvest time, when maximum density is reached, all stages - eggs, larvae, and adults - can be observed on infested plants. The pest multiplies massively at relatively lower temperatures (16-22 ^{O}C) and high humidity (85-90%). The presence of young leaves with tender consistency is also of great importance. At higher temperatures and reduced humidity, it enters a depression.

Females settle on the underside of leaves, most often near the veins, where they suck sap and begin laying eggs. The minimum temperature for starting egg-laying is 13°C, and the optimum is 16-18°C. Optimal humidity is above 80%, and at humidity below 50%, mites die within 36 hours. Embryonic development lasts 10-15 days.

Newly hatched larvae also suck sap and are most dangerous at this time. Damaged leaves remain small and deformed, turn yellow, and dry out in dry weather or rot in wet conditions. The pest has a preference for young leaves with tender consistency. Sometimes it remains hidden in the plant rosette and only damages there. Grown leaves are damaged, but no mites can be found on them, which makes timely identification of the causal agent difficult. Symptoms resemble damage from stem nematodes and some viral diseases. Depending on the degree of infestation, crops can reduce their yield by 20 to 70-80%. The resulting fruits are of reduced quality - small and with low sugar content, and under very severe infestation, they may dry out. The reduction in leaf size leads to a decrease in nutrients in the rhizome and poor bud set for the following year.

A check of strawberry seedlings intended for planting in August should be carried out. If strawberry mite and other pests are found, disinfestation should be performed.

In currant plantations

Plantations infested with the currant moth should be sprayed with contact insecticides from all groups. You can use one of the following products - Decis 100 EC

(12.25 ml/ha), Coragen 20 SC (30 ml/ha), Sumi Alpha 5 EC (0.03%), Karate Zeon 5 CS (15 ml/ha).



Adult currant moth (Abraxas grossulariata L.)

The currant moth (*Abraxas grossulariata* L.) is distributed throughout the country. It primarily attacks plants of the genus Ribes. The caterpillar has also been found on stone fruit crops, mahaleb cherry, and sea buckthorn.

The pest develops one generation per year. It overwinters as an underfed caterpillar of the fifth (last) instar under plant debris, soil clods, stones, etc.

Moths appear in mid-May and fly until July, but in some higher mountain regions, the flight may begin in June and continue until August. The flight coincides with fruit formation and ripening. Moths are active at night and at sunrise. Females lay their eggs in small groups (10-15 each) on the underside of leaves. Average fecundity is 200-300 eggs. Embryonic development lasts from 12 to 20 days.

Young caterpillars are greenish and feed on leaves, making barely visible holes. When shaken, they lower themselves on silk threads and hide under plant debris. Before leaf fall, caterpillars wrap themselves in silk threads and fall to the ground along with falling leaves, where they overwinter.

In vineyards

When mites multiply and the economic injury level is exceeded, hormonal acaricides such as Nissorun 10 WP (75 g/ha) should be used against eggs and young larvae. For mobile stages (larvae, nymphs, and adults), contact acaricides can be used - Danitron 5 SC (100 ml/ha), Shirudo (25 g/ha), Limocide (200 ml/ha), Prev-Gold (80-400 ml/ha), Thiovit Jet 80 WG (2000 g/ha).

With frequent rainfall, likely in the first and third ten-day periods of the month, monitor for downy mildew and gray mold.

Against downy mildew, after sporulation of the pathogen, treat with one of the following products - Quadris 25 SC - 0.075-0.1%, Ridomil Gold Combi 45 WG - 200 g/ha, Ridomil Gold R WG - 500 g/ha, Ridomil Gold SL - 20 ml/ha. Serenade ASO is also an option, but it is less effective than the systemic fungicides listed. Before rain, since the listed fungicides are not systemic, you can use a copper-based product - 1% Bordeaux mixture - 180-300 g/ha solution, Funguran OH 50 WP - 150-250 g/ha, Champion WP - 0.3%, Copper Key - 180-300 g/ha.



Against gray mold, treat with one of the following products - Switch 62.5 WG (100 g/ha), Folpan 80 WDG (0.15%), or another product with the active substance folpet. Among biofungicides, Polyversum (50-100 g/ha) and Serenade ASO SC (400 ml/ha) are recommended.

Inspect vine nurseries for downy mildew, powdery mildew, and mites - especially the European red mite.

Against powdery mildew, you can treat with one of the following products - contact fungicides - Acoidal WG - 0.25%, Azumo 80 WG - 400 g/ha, Cumulus - 0.2-0.5%, Solfo 80 WG - 400 g/ha; systemic - Flint Max 75 WG - 0.016%, Folicur 250 EW - 0.04%, Custodia 320 SC - 75 ml/ha, Dinali 090 DC - 50-65 ml/ha, Domark 10 EC - 25-30 ml/ha, Dynasty 25 EW - 40 ml/ha, Luna Experience - 12-40 ml/ha, Synstar - 70-80 ml/ha.