

Plant protection practices in vegetable crops in March

Author(s): проф. д-р Стойка Машева, ИЗК "Марица" Пловдив; проф. д-р Винелина Янкова, ИЗК "Марица" в Пловдив

Date: 12.03.2023 *Issue:* 3/2023



With the onset of March, nature awakens and agricultural activity begins. In parallel, pests also become active. The attention of landowners and farmers must be focused on the successful start of the production season, on which to a large extent depend the good protection of crops, obtaining quality produce, good yields and high income. March is characterized by changeable weather. Large fluctuations in temperature are observed, as well as different types and amounts of precipitation (snow-rain). The length of the day increases. Favourable conditions for outdoor work are created. It is not uncommon to have cold spells and more precipitation, which complicate field agricultural practices.



In the seedling section care for the seedlings (tomatoes, peppers, eggplants, cucumbers) continues. To obtain healthy seedlings, the difference between day and night temperatures should not exceed 6–8⁰C so as not to provoke “false damping-off” of the seedlings. Attention should be paid to the fact that some pests transmit dangerous viral diseases in vegetable crops: aphids – various mosaics; thrips – tomato spotted wilt; whiteflies – yellows. This necessitates daily monitoring to detect the appearance of pests and the timely implementation of plant protection measures, in order to avoid the risk of diseased, virus-infected plants which will subsequently compromise the stands and production. In the seedling section, soil moisture is maintained at 50-60% of field capacity and substrate temperature at 20-25⁰C. Nutrient regime control is of great importance for the quality of the seedlings: pH = 6.2 – 6.8, total salt concentration of the substrate – EC = 1.2 – 1.8 mS/cm depending on the seedlings (dense, pricked out) and the crop.



In greenhouses the early production of tomatoes and cucumbers has already been planted. If the greenhouse is unheated, planting of peppers is forthcoming at a later stage. The diseases and pests observed in already transplanted plants are the same as those that attack the seedlings. Regular monitoring is necessary for early detection of the appearance of diseases and pests and preventive plant protection, in accordance with the economic injury levels (EIL). Yellow, light blue and black sticky traps are hung to detect and capture the flying forms of small insects (greenhouse whitefly, aphids, tomato leaf miner). Pheromone traps can also be used to establish the beginning of the flight of the tomato leaf miner, as well as to reduce its population density. Attacked leaves, petioles with disease spots, colonies of aphids, egg clusters, larvae, mines, etc. are collected and removed from the greenhouse for destruction.

DISEASES



Early blight (leaf spots) (*Alternaria spp.*)

Leaf spots are dark brown to black with a concentric structure. Similar spots appear on the other above-ground parts. Attack on flower stalks causes flower drop. Fruit spots are most often located at the stem end and also have a concentric structure. Diseased parts are covered with a dark coating of the fungal sporulation. The pathogen prefers old leaves that have completed their growth. It develops under conditions of high relative humidity.

Control

Maintaining an optimal temperature and humidity regime in protected cultivation structures; Regular ventilation of the structures; Treatment with plant protection products (PPP) at onset of symptoms or under favourable conditions. Registered PPP: Dagonis 100 ml/da; Polyram DF 0.2%; Prev-Gold 200-600 ml/da; Sinstar 70-80 ml/da; Taegro 18.5-37.0 g/da; Tazer 250 SC 80-200 ml/da.



Grey mould (Botrytis rot) of tomato (*Botrytis cinerea*)

All above-ground parts of the plants are attacked. The disease develops at high air humidity. The spots are water-soaked and later become necrotic, covered with abundant grey-brown mycelium and fungal sporulation. Conidia of the pathogen are spread by air currents and cause new infections. The pathogen can also exist as a saprophyte in the soil.

Control

Maintaining optimal air humidity in the seedling section and planted greenhouses; Regular ventilation; Removal of infected plant parts and their destruction outside; At appearance of the first spots, treatment with PPP is carried out. Registered PPP: Avalon 200 ml/da; Geox WG 50 g/da; Erune 40 SC 200 ml/da; Pretil 200 ml/da; Prolectus 50 WG 80-120 g/da; Signum 100-150 g/da; Switch 62.5 WG 100 g/da; Fontelis SC 240 ml/da.

**Leaf mould (*Fulvia fulva*)**

On the upper side of the leaves, relatively large, light spots of irregular shape with indistinct margins appear. Later they turn yellow. Under high air humidity, their lower surface is covered with a light coating of fungal sporulation, which later darkens and becomes velvety brown. When the number of spots on one leaf is significant, they coalesce and the leaf becomes necrotic. Under favourable conditions, plants may become defoliated. The disease develops under conditions of high air humidity.

Control

Cultivation of varieties resistant to the disease (most of the varieties offered on the market are resistant). Maintaining optimal air humidity in the seedling section; Regular ventilation; Balanced fertilization; Destruction of plant residues and weeds, as the pathogen survives in them. When necessary – treatment with PPP. Registered PPP: Eminent 125 ME 40-60 ml/da; Signum 100-150 g/da.



Downy mildew of cucumber (cucurbit downy mildew) (*Pseudoperonospora cubensis*)

This disease is important during the entire vegetation period of cucumbers. On the upper side of the leaves, yellowish spots of irregular shape appear, limited by the veins. In wet weather they are water-soaked and the lower surface is covered with a sparse grey-violet coating of fungal sporulation. Later the spots enlarge, coalesce and the entire leaf becomes necrotic. Under high air humidity in the seedling section, the disease can in a short time affect the whole plant and severely reduce yield.

Control: Maintaining an optimal air and moisture regime; Regular ventilation of the section; Starting heating in the early hours of the day prevents dew formation and downy mildew infection; Removal of the first diseased leaves and their destruction outside the greenhouse. When necessary, treatment with PPP. Registered PPP: Enervin SC 120 g/da; Prev-Gold 160-600 ml/da; Taegro 18.5-37.0 g/da.

**Powdery mildew of cucumber (*Podosphaera xanthii*, *Erysiphe cichoracearum*)**

On the leaves small spots of irregular shape appear, dusted with a white powdery coating of fungal sporulation. Later the spots coalesce. The leaves become necrotic. Spots can be observed on both the upper and lower leaf surface, as well as on petioles and stems. The fungi overwinter as conidia on plant residues, as mycelium and spores on greenhouse crops. Conidia are spread by air currents and cause new infections. Favourable conditions for development are: disturbed temperature and humidity regime; unbalanced nitrogen fertilization; reduced light.

Control: Cultivation of resistant varieties; Removal of plant residues from the previous vegetation; Balanced nitrogen fertilization; Maintaining an optimal temperature and humidity regime; Treatment with PPP at appearance of the first spots. Registered PPP: Vivando 20 ml/da (0.02%); Dagonis 60 ml/da; Domark 10 EC 50 ml/da; Collis SC 40-50 ml/da; Sivar 80 ml/da; Sonata SC 500-1000 ml/da; Trunfo 80 ml/da; Phytosev 200 ml/da; Fontelis SC 240 ml/da.

PESTS

**Aphids (fam. *Aphididae*)**

They are frequently observed in vegetable crops even during seedling production and after transplanting. They develop on the apical, young parts of plants and often form dense colonies. They have a high reproductive capacity. They cause chlorotic spots on the leaves and deformations. They contaminate the leaf surface with “honeydew”, on which sooty mould fungi develop, contaminating the leaves and hindering photosynthesis. Plants lag in their development. They are vectors of viral diseases.

Control

Upon detection of the first individuals in the seedlings, treatment with PPP should be carried out; The last treatment is carried out immediately before planting at the permanent site; Destruction of weed vegetation, which is a reservoir for aphid survival and a source of virus infection. Registered PPP: Azatin EC 100-150 ml/da; Ampligo 150 ZC 40 ml/da; Delmur 50 ml/da; Deltagri 30-50 ml/da; Closer 120 SC 20 ml/da; Mavrik 2 F 20 ml/da; Neemik Ten 390 ml/da; Oikos 100-150 ml/da; Sivanto Prime 45 ml/da; Teppeki/Aphinto 10 g/da; Flipper 1-2 l/da; Citrin Max/Cyperkill 500 EC 10 ml/da; Shirudo 15 g/da.

**Thrips (*Thrips tabaci*; *Frankliniella occidentalis*)**

In recent years they have become some of the main and most common pests in crops. On the attacked plant organs (leaves, flowers and fruits) small whitish (silvery) spots with dark dots appear, which are the excrements of the pest. At higher population density the spots coalesce, leaves become mottled and sometimes dry out. The generative organs of plants attacked by these pests are deformed and drop. Onion thrips is found mainly on leaves, less often on flowers. Western flower thrips can easily be found in flowers. It has high vitality and adaptability to environmental conditions and therefore competes in harmfulness with onion thrips. Favourable conditions for their development are high temperatures and low air humidity. Thrips are vectors of tomato spotted wilt virus.

Control

Blue sticky traps should be used for monitoring, which in greater number reduce pest density; Maintaining optimal air humidity in the structures; In case of appearance, treatment with PPP is carried out at EIL for tomatoes of 1 adult/1 flower, 3 adults and larvae/1 leaf; for cucumbers 1 adult and larvae/flower, 3-5 adults and larvae/leaf. Registered PPP: Azatin EC 100-150 ml/da; Dicarzol 10 SP 556 g/da; Exalt 200-240 ml/da; Limocid 800 ml/da; Neemik Ten 390 ml/da; Oikos 100-150 ml/da; Requiem Prime 500-1000 ml/da; Sineis 480 SC 10-37.5 ml/da; Naturalis 100-150 ml/da.

**Greenhouse whitefly (*Trialeurodes vaporariorum*)**

Larvae, nymphs and adults cause damage. They suck sap mainly from the lower side of plant leaves. On attacked leaves adults, eggs and larvae can be observed simultaneously. During feeding, larvae excrete large amounts of sugars in the form of "honeydew", as a result of which leaves become sticky. Sooty mould fungi develop and the physiological processes of attacked plants are disturbed. Leaves turn yellow and attacked plants lag in development. Whitefly also causes indirect damage as a vector of cucurbit infectious yellows virus, most often in cucumbers.

Control

To monitor the appearance and density of whitefly, yellow sticky traps should be used; At the appearance of the first individuals, treatment with PPP is carried out. Authorised PPP: Abanto 75 ml/da; Azatin EC 100-150 ml/da; Bray 50-112.5 ml/da; Limocid 400 ml/da; Closer 120 SC 20-40 ml/da; Chrysant EC 75 ml/da; Natur Breaker 75 ml/da; Neemik Ten 390 ml/da; Oikos 100-150 ml/da; Orocid Plus 80-800 ml/da; Pyregard 75 ml/da; Prev-Gold 160-600 ml/da; Requiem Prime 500-1000 ml/da; Sivanto Prime 56 ml/da; Naturalis 75-100 ml/da.

**Tomato leaf miner (*Tuta absoluta*)**

This pest has created serious problems in tomato cultivation in recent years. It can be observed already in the seedlings. The moths are active at night and during the day hide among the leaves. Larvae cause the damage. They prefer leaves the most, but also attack fruits. The moth forms short, wide and irregular mines on the leaves, in which larvae and excrements can be seen, located at one end. Damage to fruits consists of mines that are an entry point for diseases and rotting processes. Damaged fruits lack marketable appearance.

Control

Use of pheromone traps and black sticky boards for timely detection of the pest, reduction of its population density and taking adequate control measures.



Macrolophus pygmaeus

At low density, one of the biological control agents *Macrolophus pygmaeus* or *Nesidiocoris tenuis* may be released.

Treatment with PPP is carried out at EIL when 10% of the leaves have mines. Registered PPP: Altacor 35 WG 8-12 g/da; Ampligo 150 ZC 40 ml/da; Affirm 095 SG 150 g/da; Voliam Targo 063 SC 80 ml/da; Delmur 50 ml/da; Exalt 200-240 ml/da; Coragen 20 SC 14-20 ml/da; Neemik Ten 390 ml/da; Neem Azal T/S 0.3%; Oikos 150 ml/da; Rapax SBS 100-200 ml/da; Sineis 480 SC 10-25 ml/da.

In the field

During this period, sowing of early crops begins – potatoes, peas, garlic, onion from seed and sets, carrots, parsley, celery, etc. Only healthy and treated seed and planting material should be used for sowing.

**Rhizoctonia disease of potato (*Rhizoctonia solani*)**

On infected tubers, dark to black sclerotia of the fungus are observed. On the sprouts of infected tubers, black-brown spots appear, causing their death. It is spread through infected tubers. It develops under monoculture and on heavy soils. It survives as sclerotia on tubers and in the soil. It develops at temperatures between 6-33°C and humidity of 30-90%.

Control

Introduction of a 6-8 year crop rotation; Use of healthy planting material; Treatment with PPP. Authorised PPP: Proradix 2 g/100 kg tubers (for treatment of tubers before or during planting).

Wireworms (fam. *Elateridae*)

Larvae bore into potato tubers and make tunnels in them, destroying sprouts. As a result, they rot because pathogenic microorganisms enter through the tunnels. Larvae are most harmful at temperatures of 14-17°C and 65% field capacity. These pests are polyphagous and can also damage other crops such as tomato, cucumber, pepper, eggplant, carrot, etc.

Control

When 4-6 larvae/m² are established, furrow insecticides are applied simultaneously with planting. Authorised PPP: Vidate 10G 2 kg/da; Ercole GR 1000-1500 g/da; Nemathorin G 2 kg/da; Trika Expert 1000-1500 g/da; Belem 0.8 MG/Colombo 0.8 MG 1.2-2.4 kg/da; Colombo Pro 1.2-2.4 kg/da; Naturalis 100-300 ml/da; Force[®] Evo 1.2-1.6 kg/da; Microseed Geo/Sobek Up 1.2-1.5 kg/da.



Onion fly (*Delia antiqua*)

This pest is specialized on onion but also slightly attacks garlic. It develops two full and partially a third generation. It overwinters as a pupa in the soil at a depth of 10-20 cm. The flight of flies of the first generation usually begins in April, during cherry blossom, but in recent years, with climate warming, it can be observed as early as the end of March. They lay their eggs on the leaves, on the bulbs and on the soil surface near the plants. Damage is caused by the larvae of the first generation. They bore into the plants at the base of the leaves. They make longitudinal tunnels in the stems and move towards the bulb. Damaged plants lag in development, become pale, lodge and finally dry out. As a result of the damage, tissues ferment and emit an unpleasant smell of rotten onion. Several larvae can develop in one plant, and if they cannot feed sufficiently, they attack the stems of neighbouring plants.

Control

Onion should be planted early, because late stands are attacked more severely. Stands should be well established. Plants with signs of damage should be removed in time, thus preventing larvae from moving into healthy plants. No bulbs should be left unharvested and volunteer onion should be destroyed, as the fly continues its development in them. Chemical control is aimed at adults before egg laying at 5 flies/10 sweeps with an entomological net. Some broad-spectrum plant protection products from the pyrethroid group may be used, strictly observing pre-harvest intervals. Authorised PPP: Belem 0.8 MG/Colombo 0.8 MG 1.2 kg/da; Colombo Pro 1.2 kg/da; Force 1.5 G 1000 g/da applied at sowing/transplanting.



Pea (root nodule) weevils (*Sitona* spp.)

Adults are small grey-black beetles which, early in spring after warming of the weather, emerge and start feeding on the youngest and most tender leaves of plants. They make semi-lunar notches. In some years, under mass attack, they can destroy entire stands. Larvae damage the root nodules. Thus, the amount of fixed nitrogen is reduced and with it the pea yield.

Control

It is necessary to maintain spatial isolation of annual legume crops from old lucerne stands, thereby limiting the spread of root nodule weevils. Authorised PPP: Decis 100 EC 6.25 ml/da; Vaztak Nov 100 EC 12.5 ml/da.

ATTENTION!

Only PPP at the registered dose, included in the LIST OF PLANT PROTECTION PRODUCTS AUTHORISED FOR PLACING ON THE MARKET AND USE, published on the website of the BFSA, shall be applied.

PPP shall be purchased only from traders holding an authorisation for the activity and included in the LIST OF COMPANIES AUTHORISED TO PERFORM THE ACTIVITIES WHOLESAL TRADE IN PLANT PROTECTION PRODUCTS, RETAIL TRADE IN PLANT PROTECTION PRODUCTS IN AGRICULTURAL PHARMACIES, REPACKAGING OF PLANT PROTECTION PRODUCTS AND FUMIGATION AND DISINFECTION OF AREAS, PREMISES AND PLANT PRODUCTION AGAINST PESTS, published on the website of the BFSA.