

# Care during seedling production

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In the seedling facilities, seedlings are grown for unheated glass and polyethylene greenhouses and for low tunnels. Sowing of seeds for early field crops begins – tomato, pepper, eggplant, cabbage, and later also for medium-early crops. The seedling facilities are cleaned of plant residues from the previous vegetation, as well as weeds and volunteer plants. The seedling mixture is prepared. It is best for it to be a peat–perlite mixture, which is used to fill trays, flats and pots. If they are placed directly on the soil, the surface must be well leveled. A polyethylene film is placed on it, which insulates the seedling containers from the soil and does not allow the passage of pathogens and pests. Healthy or disinfected seeds are used for sowing. An optimal temperature and humidity regime is ensured in the seedling compartment.

## I. Diseases

### Damping-off of seedlings – True damping-off

*Pathogen* – Pythium, Phytophthora, Rhizoctonia, Fusarium

*Symptoms/Damage:*

- Death of the sprouts;
- Reddish-brown spots on the sprouts;
- Watery spots at the base of the stem;
- The damping-off develops in the soil and the damage is difficult to notice.

*Life cycle:*

- The pathogens are widespread everywhere;
- It occurs at low air and soil temperatures, waterlogging, excessive nitrogen fertilization, etc.
- Seedlings that have emerged under such conditions are not well established. The number of plants is severely reduced.

### Damping-off of seedlings – False damping-off

*Cause* – Non-infectious disorder

*Symptoms/Damage:*

- The stem becomes threadlike just above the root collar and the plant lodges.
- The spots are dry. Saprophytic microorganisms penetrate through them.
- It occurs at temperatures higher than the optimum, when the soil surface overheats.
- It also attacks overaged plants. Small cankers and rings appear on their bark.

## *Life cycle:*

Such damage is observed when plants are grown on light, sandy soils and are exposed for a prolonged period to high temperatures.

False damping-off can be avoided if soil drying is not allowed.

Unbalanced nitrogen fertilization and lack of sufficient light are also prerequisites for its occurrence.

## *Control (for both types of damping-off of seedlings):*

- Sowing of disinfected seeds;
- Seed disinfection: thermal treatment against viruses; hot-water treatment of small-seeded crops; chemical treatment – with perhydrol, hydrochloric acid; treatment of seeds with Flowsan FS 1.8 ml/kg seed;
- When sowing in mixtures containing soil, they must be disinfected with Nemasol 510;
- Dusting of the seedbed before sowing with 3–4 g/m<sup>2</sup> copper oxychloride, Kocide DF or Funguran 50 WP;
- Maintaining an optimal temperature and humidity regime. The difference between day and night temperature should not exceed 6–8<sup>0</sup>C;.
- Regular irrigation of seedlings with low irrigation rates. Waterlogging and subsequent drying must not be allowed;
- Regular ventilation of the facilities;
- Preventive treatments of seedlings are carried out every 7–10 days with copper-containing fungicides;
- Upon occurrence of damping-off, diseased plants are collected and destroyed outside the facility. The spots are disinfected with a 3% solution of copper sulfate or ammonium nitrate. The remaining plants are treated with registered fungicides – Beltanol 400 g/ha, Proplant 722 SL 0.1%, or a mixture of Proplant 722 SL 0.1% + Topsin M 0.1%; Rival 5 ml/m<sup>2</sup>.

## **Brown leaf spots (early blight) on tomato**

*Pathogen – Alternaria spp.*

## *Symptoms/Damage:*

Small watery spots appear on the leaves, reaching 5–7 mm in diameter. Later the spots dry out, become dark brown to black with a concentric structure, coalesce and the leaf scorches.

The spots on the stem and petioles are similar, with the characteristic concentric structure. They can completely girdle the affected parts and cause them to dry above the point of damage.

Spots on the flower pedicels cause flower drop.

The affected areas are covered with a black mould of the fungal sporulation.

## *Life cycle:*

It survives as mycelium in plant residues in the soil.

It is transmitted on the seed surface.

The fungus prefers old leaves that have completed their growth, but it also attacks the entire plant.

It develops under conditions of high relative humidity.

## *Control:*

- Seed disinfection;
- Production of seedlings in sterile or disinfected substrate;
- Maintaining an optimal temperature and humidity regime in the cultivation facilities;
- Regular ventilation of the facilities;
- Treatment with plant protection products upon occurrence or in the presence of favourable conditions;
- Authorised products: Acrobat Plus WG 200 g/ha; Vitene Triplo R 400–450 g/ha; Dithane DG 200 g/ha; Dithane M-45 200 g/ha; Difcor 250 SC 50 ml/ha; Zoxis 250 SC 70–80 ml/ha; Captan 80 WG 150–190 g/ha; Cerial Star 60 ml/ha; Consento SC 200 ml/ha; Quadris 25 SC 0.075%; Ortiva Top SC 100 ml/ha; Pencozeb 80 WP 200 g/ha; Pencozeb 75 WG 210 g/ha; Polyram DF 0.2%; Ridomil Gold MZ 68 WG 0.25%; Sankozeb 80 WP – 200

g/ha; Score 250 EC 0.04%; Sinstar 70–80 ml/ha; Tracer 250 EC 0.045; Fortuna Globe 200 g/ha; Cidely Top 100 ml/ha.

## Grey (Botrytis) rot on tomato

*Pathogen – Botrytis cinerea*

### *Symptoms/Damage:*

A dry brown spot appears at the base of the stem, affecting only the cortex; the pathogen penetrates inward, interrupts sap flow and the plant dies;

The spots are covered with abundant grey-brown mycelium and sporulation of the fungus; plant parts located above the affected area wilt and die;

The pathogen also affects the foliage. Light brown elongated spots appear on the petioles and tips of the leaf blades, covered with fungal sporulation.

### *Life cycle:*

It survives as sclerotia in the soil or in plant residues.

Under favourable conditions they germinate and form mycelium with abundant sporulation.

In greenhouses the fungus also survives as conidia on the soil surface, plant residues and constructions.

Carried by air currents, the conidia land on the plants and cause infection.

The fungus can also exist as a saprophyte in the soil.

### *Control:*

- Maintaining optimal air humidity in the seedling compartment. Regular ventilation;
- Destruction of plant residues and weeds, since the pathogen survives in them;
- When pruning side shoots, do not leave parts of the shoots. It is advisable to perform this operation in sunny weather and after the dew has lifted;

- The affected plant parts are collected in bags and destroyed outside;
- At increased air humidity and appearance of the first spots, treat with plant protection products;

Authorised plant protection products: Difcor 250 SC 50 ml/ha; Driza WG 150–200 g/ha; Captan 80 WG 150–190 g/ha; Prolectus 50 WG 80–120 g/ha; Signum 100–150 g/ha; Switch 62.5 WG 100 g/ha.

## Powdery mildew on cucumber

*Pathogen – Podosphaera xanthii, Erysiphe cichoracearum*

### *Symptoms/Damage:*

Small, irregularly shaped spots appear on the leaves, dusted with a white powdery coating of the fungal sporulation. Later the spots coalesce. The leaves scorch.

Spots may be observed on the upper and lower leaf surfaces, on the petioles and on the stem.

### *Life cycle:*

It overwinters as conidia on plant residues, as mycelium and spores on greenhouse crops. The 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:*

- Growing resistant varieties;
- Removal of plant residues from the previous vegetation;
- Balanced nitrogen fertilization;
- Maintaining an optimal temperature and humidity regime;
- Treatment with plant protection products at the appearance of the first spots;

- Authorised products: Bayfidan 250 EC 0.02%; Vivando 20 ml/ha (0.02%); Domark 10 EC 50 ml/ha; Zoxis 250 EC 70 ml/ha; Indar 5 EW 100 ml/ha; Caramat 2.5 EW 200 ml/ha; Collis SC 40–50 ml/ha; Quadris 25 SC 0.075%; Custodia 50–100 ml/ha; Legado 80 ml/ha; Miklofil 20–60 ml/ha; Ortiva Top SC 100 ml/ha; Ritual 20–60 ml/ha; Sivar 80 ml/ha; Systhane 20 EW 37.5 ml/ha; Systhane Ecozom EW 65–165 ml/ha; Topas 100 EC 35–50 ml/ha; Phytosev 200 ml/ha; Flint Max 75 WG 20 g/ha; Cidely Top 100 ml/ha.