



وزارة التعليم العالي والبحث العلمي

جامعة الانبار / كلية الزراعة

قسم وقاية النبات

## (امراض خضر - Vegetable diseases)



Fourth stage

المرحلة الرابعة

Plant Protection Dept.

قسم وقاية النبات

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## **Plant disease**

It is a harmful physiological activity that arises inside the plant, which hinders the plant from carrying out its vital functions, as a result of infection of the plant with living organisms (fungi, bacteria, nematodes, vascular parasites, virus). Or as a result of the plant's exposure to unsuitable environmental conditions (imbalance of fertilization, disruption of irrigation, temperature differences, frost, toxicity of pesticides, salts), which in turn is reflected on the plant in the form of apparent symptoms.

## **Solanaceous family diseases**

### **1- Late Blight of Potato and Tomato**

#### **❖ Its prevalence and importance**

- 1-This disease is considered one of the most dangerous diseases of this crop. It also affects some other plants of Solanaceous family, such as tomatoes and potatoes.
- 2- It is spread all over the world and becomes more dangerous in humid areas and in cloudy and rainy weather and causes losses in production.
- 3-The infection appears on the Potato tubers in the form of irregular spots that are slightly lower and of brown or purple color.
- 4-The cause of the disaster in Ireland in 1845 AD.

## ❖ Symptoms

1-Symptoms first appear in the form of irregular water spots on the upper surface of the leaf.

2-On the lower surface opposite the dead areas, white vellus growth appears.

3- The infection spreads quickly to include all plants that rot and give a distinctive smell when high air humidity and low temperatures are available.

4- The symptoms also appear on the infected tubers in the form of irregular spots, purple, black or brown with a dark metallic sheen. When the tuber is cut, the affected tissues appear soft first, with a brown color, then the affected tissues become dry and sunken.

5-Symptoms appear on tomato fruits in the form of grayish-green spots saturated with water and usually abound at the tip of the fruit touching the branch and may expand to include all of the fruit.



**Longitudinal section of potato tubers showing late blight**



**Infection of the tomato with late blight**

## Pathogen:

*Phytophthora infestans* follows Oomycetes, bearing branched sporangiophores, each bearing a lemon-shaped sporangium sac with an end nipple at the tip.

- ❖ Each sac consists of 3-8 ciliary sporangia or more and each sporangia with two lateral frills is released when the sac ruptures at the terminal nipple and after it settles and becomes cystic, each of them germinates and gives a germinating tube.
- ❖ At temperatures above 15 °C, sporangia sacs germinate directly by giving germination tubes and not by formation ciliary spores. The fungus reproduces sexually by forming oospores, but it is not important for renewal.

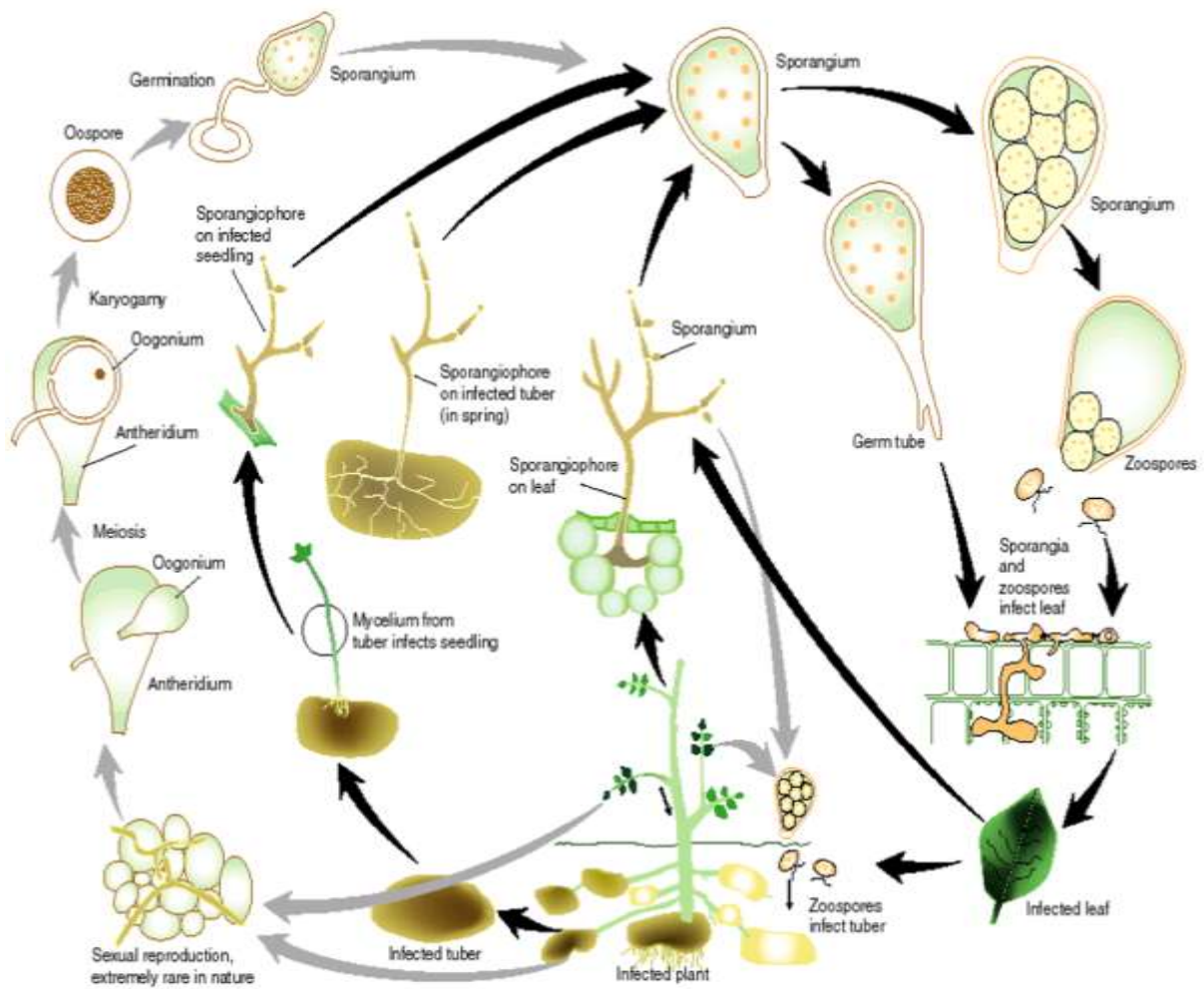


*Phytophthora infestans*

## Disease cycle:

The fungus spends the winter in the form of mycelium latent in the infected potato tubers, and the infection appears in the form of dry rotten spots and when planted, the fungus activates and infects the vegetative growth, The sack holders and the sporangia emerge from the stomata of the lower surface of the leaves and stems, and when the sacks mature, they spread in the air due to rain, as they fall on the leaves and stems of the peaceful potato or tomato plants. The germination tubes sprout and penetrate the stomata of the host or cuticle of the leaf and produce mycelium that grows between the cells, causing their killing. Then it comes out in the form of sporangia sac carriers from the stomata of the lower surface of the leaves and re-infection, causing secondary infection. As for the infection of the tubers, it takes place when rain washes the sporangia bags from the affected leaves into the soil where the ciliary spores sprout and penetrate the tubes of tuber germination through the lentils and wounds. The tubers may also be infected during storage.





**cycle of the pathogen of late blight *Phytophthora infestans***

**Control:**

- ❖ Choosing healthy tubers from stores for the purpose of planting them and getting rid of the primary infection
- ❖ . Planting autumn potatoes early leads to the production of an early crop that is rarely affected by late blight, and potatoes are not planted in the autumn lug near potato farms

- ❖ cultivation of potatoes in high places such as hills leads to a decrease in the incidence of late blight due to the presence of air currents that reduce air humidity.
- ❖ Cultivation of disease-resistant varieties of tomatoes and potatoes.
- ❖ Follow an agricultural cycle that does not include the potato or tomato crop.
- ❖ Deep plowing of potato tubers infected with late blight to reduce the source of pollen from the causative fungus.



**Pictures of plants infested with late blight**



## 2- Early blight of potato, tomato, pepper and eggplant

The disease spreads in Iraq in warm regions, especially in the spring season.

### Symptoms:

- 1- It infects seedlings, causing their death. The infection appears on adult plants at the beginning of the formation of tubers or tomato fruits in the form of small round or oval dark brown or black spots that appear first on the lower leaves of the plant.
- 2- The spots are characterized by the presence of clear overlapping rings surrounded by a yellow halo. It is one of the diagnostic symptoms of the disease. The leaves turn yellow, dry and fall off, starting from the bottom, followed by the upper leaves. On the old stems, sunken brown spots or ulcers appear on the aged stems.
- 3- Symptoms appear on tomato fruits in the form of brown or brown spots that are slightly low and covered with cottony growth. The disease appears on potato tubers in the form of small round or irregular dark and slightly sunken spots. The tissue below the ulcer is brown and dry cork to a depth of several millimeters.



**Pictures of plants infested with early blight**



**Pictures of plants infested with early blight**

## Pathogen:

The disease is caused by the fungus *Alternaria solani*, follows the fungi imperfect, the mycelium is dark and divided with transverse walls. On it arise short dark conidia bearing single long dark conidia or in a short chain of spore and the spore divided by a transverse wall and long into several cells, cells with a long beak.



conidia *Alternaria solani*

### Disease cycle:

- 1-The fungus is found in the form of mycelium in plant residues, seeds and bushes of the Solanaceae family.
- 2-Conidia germinate in a short period in humid weather and over a wide range of temperatures ranging from 5 - 35 ° C, and the optimum temperature is about 30 ° C.
- 3- The germination tubes penetrate the leaves and stems of the plant through the wounds or the cuticle layer, where the symptoms of the disease appear diseases after several days of infection and in the presence of dew the fungus infects.
- 4- Conidia spreads by wind carrying moisture to healthy plants, where it re-infects during the growing season.

### Control:

- 1- Selection of healthy seeds from potato tubers and using exported or imported seeds from tomatoes, peppers and eggplants.
- 2- Treating the seeds with fungicides.
- 3- Cultivation of resistant varieties.
- 4- Disposal of the remnants of solanaceous crops in the field.
- 5- Follow a cultivation cycle in which the Solanaceae family does not enter for a period of three years.
- 6- Regular watering to avoid cracking fruits.

## References

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