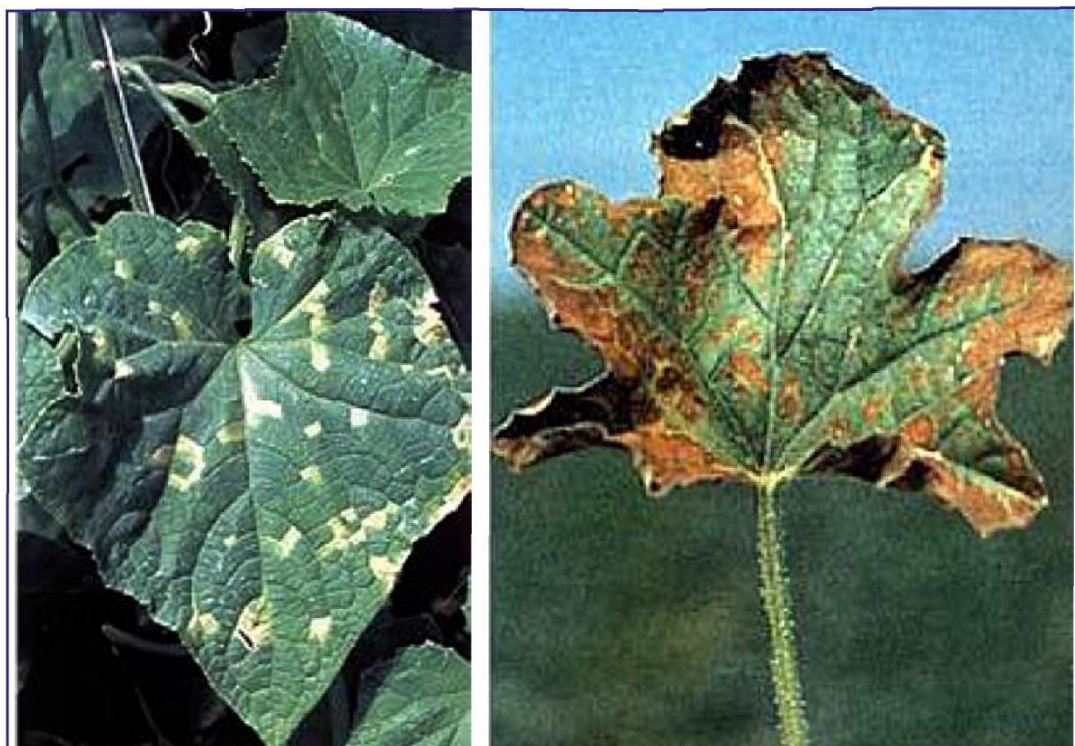


**MINISTRY OF AGRICULTURE AND WATER
MANAGEMENT OF TURKMENISTAN
TURKMEN AGRICULTURAL INSTITUTE
AGRICULTURAL RESEARCH INSTITUTE**

DISEASES OF CUCURBITACEOUS AND CONTROL MEASURES

Scientific-practical manual



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The main diseases of melon crops in the scientific-industrial guide, them microorganisms, disease outbreaks, spread, crop failure and the ways in which they can be countered. information is also provided.

Guide garden tenants, landlords, professionals, teachers and intended for students.

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INTRODUCTION

Honorable in the era of prosperity of our sovereign state under the leadership of our President, in the year of Turkmenistan – heart of the Great Silk Road, the economical branch of the agricultural sector of our country strengthens even more. In this regard, our esteemed President's decisions and decrees, which were adopted in September 2017 at the meeting of Elders Council of Turkmenistan, help to develop agricultural sector.

Our highly esteemed President creates all opportunities for the farmers to work, to produce high yields from the soil and to live an abundant life. On this basis, labor and social security law is fastened.

It is the same great attentions are paid to grow cotton and to develop vegetable crops on a scientific basis, to increase their productivity in our country.

In gardening, land, water, high quality seeds, mineral fertilizers different types, modern powerful agricultural machinery and other necessary supply issues are being addressed positively. Agro technical measures are required to reap a bountiful harvest from melon crops. In addition to their proper implementation, during their development, the collection land is a scientific study of various diseases that occur during the storage of harvest on the basis of protection. In this regard, the development of private entrepreneurship, products substituting for imported production, to increase the export potential of our country, efficient use of land, by planting various crops at the same time, to preserve the harvested harvest carefully, without wasting it, we have opportunities all year round. The supply of fresh vegetables and melons our people all year around is an important task in our country. The achievements of science have a great effect to do all these.

Therefore, in the manual, we have written about the symptoms of various diseases that occur in melon, watermelon, pumpkin, cucumber and other melon crops, and agro technical, chemical control measures against diseases.

1. BACTERIAL DISEASES OF CUCURBITACEOUS AND CONTROL MEASURES

1.1. Bacterial rottenness of cucurbitaceous

Disease of bacterial rottenness of cucurbitaceous are: moist rottenness (*Erwinia carotovora pv. carotovora*), brown spotting (*Erwinia pineapple . n*), bacterial necrosis (*Erwinia carnegiena*).

Moist rottenness (Humid Bacterial Rottenness) is arisen by the rod-shaped bacteria as *Pseudomonas Disease burger*. Moist rottenness occurs in the plants which belong to the pumpkin family in the disturbance of physiological phenomena. If the crop is poorly pollinated or they have anthracnose, other rotten disease it can infect to bacteria of moist rottenness disease. Disease can occur and reproduce during the growing of the plant. Saturated green spots form on the leaves of the plant. Then it turns brown. Often, on the back of the leaf there can be seen the oily stains. Oily stain is located around the central vein of the leaf then they join together and form necrosis (burns) of 20-30 mm in size.

The young plant loses when it forms the 2nd and 6th leaves its turgor condition during the high-temperature period. But the plant restored its turgor condition again until early morning. The event lasts for several days. Planting and drying happens with poppy. In the stalks of the cucurbitaceous, the serration phenomenon begins and the exudate is released. When we cut the stem horizontal, the veins and tissues of the conduit become brown. Plants, in the case of moist rottenness, often do not dry out, but they retard. The lower leaves of moist rottenness raises. They form a large number of flowers between short stems. So the vegetable has an ugly image, not a normal one. Moist rottenness occurs first, 1-2 mm of watery oil stains. Cucurbitaceous with bacterial disease have a soft outside and there is watery areas are formed (*Fig. 1*). Gradually the water stains grow and spread all over the place.

The disease enters the crop – in the central part. The pathogen spreads rapidly through the pathways to the plant and leads to the formation of. Gray the exudate occur there, where the seed is formed, the crop becomes a completely soft water mass.



Figure 1. Melon brown spot disease

The disease is widely reported in the field. They are in the Greenhouse conditions. Beside them there will be condition to occur the moist rottenness during the harvest period. The stone of the harvest of the melon happens by softening and disintegrating. As a result, the crop is rotten. Moist rottenness is most common in hot and humid climates (*Fig. 2*).



Figure 2. Melon rot

Bacteria of moist rotteness spreads with the disease seed infestation and incomplete decomposition of plant residues. It can spread with mouths and injured areas of plants. If the disease intensifies for 5-10 days during the incubation period, it can damage 40% of the crop and more.

Control measures. Only healthy seeds are gathered, peeled, and then treated. The crops belonging to the pumpkin family can be planted after the 4 years break. The disease first occurs in the seed part and then it should be treated with remedy. Again, if it is necessary, fungicide should be used.

Brown stains are found in melons. There is yellowish brown, hearty, and smooth stain with symptoms of diameter 4 sm. (*Figure 1*). Brown stains disease can be occur in such condition as moist rotteness.

Bacterial necrosis is most common in melons and watermelons come on. Dry solid necrosis spots on the stalks of melon and watermelon is formed. In the external symptoms of the disease, the spots turn from red to brown. Spots were larger than 3 mm in diameter consist of a set of dead cells. Watermelon doesn't show an external symptom of the disease. But it looks good on the inner meal part (*Fig. 3*).



Figure 3. Bacterial necrosis of melon stalk

Symptoms of bacterial necrosis of the melon stem differ from the watermelon. That is, the first dead cell tissues penetrate better on the inside of melon. Also there are formed water-like round beads and beads. Bacterial necrosis has not been adequately studied. However, according some information in the bad climate there is inflaming event. This leads

to the onset of the disease. Some varieties of melon and watermelon do not accept the bacterial necrosis bacteria.

Control measures. To prevent moist rotteness belonging to the pumpkin family we must gather the harvest during the harvest season without damaging the crop. In cucurbitaceous melon, watermelon and other crops must be cooled. In picking and placing in special containers of melon and watermelon preventive measures must be held. That is, the crop must be treated with chlorinated solutions. In preventive measures, especially crop failure, it is necessary to prevent. Mechanical damage to the yield of cucurbitaceous should be protected from deficiency.

1.2. Bacterial leprosy of cucurbitaceous

Bacterial leprosy occurs by the *Erwinia tracheiphila* bacteria. This disease causes great damage to cucumbers and melons. It has a low influence to watermelon and young melon (gokternek). First white green oaks appear on the leaves of the plant. In addition, through the time **leprosy** of the leaves and stems increase. As a result, the plant withers completely, but it doesn't die. Fading leaves of a plant can occur in any time of the developmental period. Especially during the period of strong growth of the plant can be seen (*Figure 4*).



Figure 4. Bacterial leprosy of melon crops

The leaves of the diseased plant chlorosis (chlorophyll disintegration) and necrosis (vegetation) on the edges of the tissue disintegration symptoms occur. At the end necrosis occur in the plant, and it dies. When the plants are given diagnosis in the field conditions it should be cut to the width of the broad stem. The cut-off pieces are connected one by one. Thus, in a bacterial diseased plant, there is an adhesive and stretchable substance there. This substance is a bacterial exudate.

Bacterial leprosy is spread by leaf eaters. One cell 11 pointed caterpillars (*Diabrotica undecimpunctata howardi*) and South American leaf eater are spreaders of leprosy. The digestive system of insects is the translator. These pests affect the leaves of diseased plants.

With healthy plant leaves when fed to a healthy plant that causes leprosy conducts. This phyto potagen bacterial plant cannot survive until the next stage of development.

Control measures. Wild plants belonging to the pumpkin family must be closed from the plants of the cultural pumpkin. This is because during the early growth of the crop, bacterial infections prevent the occurrence of. The effective way of control measures is to reduce the number of insect-borne insects.

2. FUNGAL DISEASES OF CUCURBITACEOUS AND CONTROL MEASURES

2.1. Alternariosis of cucurbitaceous

Alternariosis is common in melons, and damages watermelon, cucumber at least. The causative agent is an *Alternaria cucumerina* mushroom. Alternariosis the first symptoms appear on the upper part of the leaf. Leaf has yellowish brown spots and the middle is whitish. The spots enlarge and turn light brown. Leaf veins within the spots considered. Those places are turning into a network. On the surface of the leaf the shapes form a ring. From time to time spots cover all parts of the leaf. As a result, the leaves fall off. The sun has set on melons, watermelons and other cucurbitaceous burning scars appear. The amount of dry matter in cucurbitaceous decreases.

The plant is exposed to the sun and wind. There is a round light brown spot first on the melon, and finally on the melon there is a finely ground coating is formed. This is the formation of spores of the fungus

then the color eventually turns dark black. The unintentional damage to melons during harvest leads to the emergence of the fungus. It causes stored in grasses, cultural crops, and plant residues. Many spores spread through wind, air and water drop in the fields. Humidity and rainfall irrigation create opportunity to spread Alternariosis in warm weather Let. It can infect when there is moisture for 2-8 hours on the leaves Plant. Oily infect level is determined with retention time of water on leaf. The duration of precipitation drop from the water extends the duration of the spread.

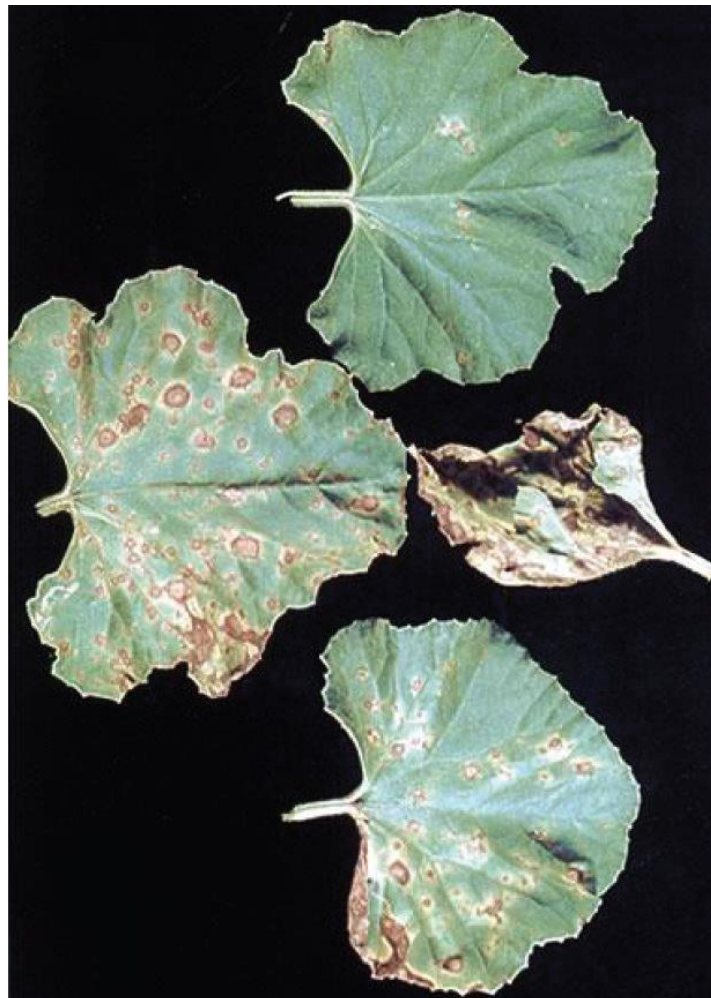


Figure 5. Alternariosis of cucurbitaceous

Control Measures. Cucurbitaceous must be worked with fungicides. It should be used also resistant to alternariosis varieties of cucurbitaceous. In agricultural fields must be conducted crop rotation. The crops of the pumpkin family should not be allowed to plant in the field for more than a year.

2.2. Anthracnose disease of cucurbitaceous

Anthracnose is found in melon, cucumber, and in watermelon. *Colletotrichum orbiculare* mushroom creates this disease. Regardless of the phase of growth of the cucurbitaceous fungal occurs in the surface organs. Anthracnose reveals moisture spots on the leaf. These stains over time turn into yellow-brown color, eventually enlarging. These stains are brown and the central part is whitish. Leaf margins do not limit stains. In the leaf stalk of a plant there are long yellow spots on the tops of the branches turn brown, intermingling with each other, holds the entire leaf. In the fruits of cucurbitaceous, a round spot of water with a spike-like texture jacks are formed. Their size becomes larger and the central part turns into black.



Figure 6. Anthracnose of melon

The humidity level is black under extreme conditions a mushroom with pink or purple glue from the dots spores flow. The spots on the watermelon leaves are black. The damaged area dries quickly. It gives the plant a burning color. When the young crop is damaged by a fruit tree, it shrinks. When a fungal disease occurs in the young crop cucurbitaceous black-watered spots are formed. It reveals the unfavorable formation of fruits. Disease can live in the tissue of plant from one development period to the next. Ability to live for up to 2

years where there is no main plant holds. Disease can be spread through raindrops, irrigation water, wolves, farm workers' clothes, lan tools and other inventory. As well as hot humid air effects for the spread of other anthraxosis. If the disease occurs at the end of the growing season, the sales quality of the crop is declining.

Control measures. Cucurbitaceous must be worked with fungicides. In addition to the disease it is more convenient to use stable varieties.

2.3. Cercosporosis of cucurbitaceous

Cercosporosis can damage to watermelon, melon and cucumber, which belong to the pumpkin family. The causative agent is a *Cercospora citrus* mushroom. The first signs of the disease appear in the first formed leaves. The spots are round or become shapeless. Symptoms can be in the center of leaf's spot in white, yellow, brown, and light brown, and the edges of the spots are dark purple or black.

Chlorosis symptoms occur in diseased parts of the leaf. Over time, the symptoms of chlorosis added with each other the leaves turn into yellow. It sheds the leaves of the plant. Formed in melon crops the quality of the incoming crop is low and small. External for pathogen encountered in leaf stalks and twigs if conditions are favorable.

Cercosporosis are not common in cucurbitaceous. Serko-fungal spores that cause sporiosis are airflow and cold can spread over long distances with wind currents. The spread of the disease free water and a temperature of 26-32 degrees are required.



Figure 7. Cercosporosis of cucurbitaceous

Control measures. In cercosporosis, first and foremost affected plants must be removed. We must give attention to the rotation of plants in the economy. Crops belonging to the pumpkin family should be planted after 2-3 years. Plants should be treated with fungicides in time.

2.4. Rottenness of cucurbitaceous

Botrytis cinerea, *Choanephora cucurbitarum*, *Diplodia natalensis*, *Fusarium roseu*, *penicillium digitatum*, *Pythium* forms mushrooms occur the rottenness of cucurbitaceous. The rottenness of cucurbitaceous can be found in melon, watermelon and in other crops which belong pumpkin family. The disease is widespread and the symptoms depend on the weather and the pathogen. The crops belonging to the pumpkins family are left with moist soil; it gets into the mushrooms from where it left off. Cucurbitaceous' damaged mature, injured holes can be an infectious hearth for mushrooms. A rottenness fungus in the garden occurs if the crops are grown for a long time at excessive humidity soil. Agrotechnical measures in agricultural crops are necessary to conduct it on time. Regular moisture should be maintained in the soil. Crops should be treated with fungicides.



a)



b)



ç)



d)



Figure 8. Rottenness of cucurbitaceous:
a - fusarium rottenness; b - gray rottenness; c - hoanefora rottenness;
d - pitiosis rottenness; e - phytophthora rottenness; f - abdominal
rottenness

Table 1

Types and symptoms of rotting fruit of cucurbitaceous

No	Types of rotten disease	Name of plant	Symptoms of disease
1	Stomach rot	Melon, cucumber	Melon, cucumber touching the ground is formed on the standing surface. It changes color when rotten. Yellowish brown, dark brown becomes Where the disease affects small cracks appear
2	Blue rot	Melon	Top of the melon and flower together with the place where it is connected, blue covers with a soft cut
3	Hoanefora rot	Gokternek	Top of the melon and flower together with the place where it is connected, blue covers with a soft cut. The disease first affects the flowers of the pigeon hurts. In his shell a white soft melody appears. Ol on the ground later black-purple the fruit body of colored mushrooms is formed. The Gokternek is soft and becomes watery

2.5. False white fall disease of cucurbitaceous

False white fallow disease occurs in cucurbitaceous, often in melons, in cucumbers. All cucurbitaceous, which belong to the pumpkin family can be infected with this disease. *Pseudoperonospora cubensis* mushroom creates false white fall disease. This is a fungal disease found everywhere and widespread in tropical and subtropical districts.

False white spot disease reveals, first of all, on the leaves of the plant. Over time, the spots become light green. The edges of the spots are angular and the leaves turn from yellowish-brown to brown. Eventually the spots merge with each other and the leaf will be damaged.



Figure 9. False white fall disease

The mushrooms on the back of the leaf are first white, and then form a gray cut. According to the moisture in the environment the cuts turn into gray or purple. The leaves are damaged by the fungus, and the leaves remain the same without changing the spot. The leaf plate is the rope is twisted. If the disease is more severe, the leaves of the plant-causes fall and the height of the crop does not grow, the volume of the

incoming crop does not increase. The mushrooms spread far with the wind. In addition, drops of rain agricultural workers and the tools they use can help to spread it. If the moisture content in the leaves is high, the living standards of the mushrooms will increase and the crops will be white the incidence of falls is high.

Control measures. We must plant such sort of plants that Varieties resistant to false white fall disease. The crops of the pumpkin family are treated with fungicides in time. In areas where the disease is most prevalent, fungicides are specifically targeted.

2.6. Fusariosis rottenness of the stem and root of cucurbitaceous

Fusariosis rottenness occurs in watermelon, melon, cucumbers, as well as pomegranates and pumpkins. The disease is widespread in Africa, North America, Australia and in Asian countries. The *pathogen Fusarium solani.f.sp. cucurbitae* is its fungus. Both sexes of the fungus cause this disease. The pathogens of 1st sex damage the cucurbitaceous yield, roots, and the stem, while the second sex is harmful only to the resulting crop. The symptoms of the disease are similar to those of fusarium warts. If the 1st sex of the fungus causes a disease in the plant, it is a little behind the development remains. If the second sexually transmitted disease is present, the crop is full in the middle of the growing season sighs. In the fusariosis rottenness of the root, the main stem is darkened. As the rottenness grows over time, spreads to the whole stem. The affected area of the stem is soft and a lot of lanky shapes. Where the mushroom is damaged in wet weather a white cut occurs. Mushrooms in the harvest of melon crops very dry rottenness occurs when the disease occurs. The crop is rotten the ground is rounded and forms a ring shape. The phytopotogen mushroom of the disease lives in the seeds and in the soil. In the early stages of plant growth, young seedlings leads to the drying of the larvae. The soil of the fungus that causes the disease has its living soil environment and if it comes in contact with the fruits of melon crops can become infected.

Control measure. Healthy seeds should be used during the sowing to prevent the occurrence of fungal diseases. The fungus can't live long time in the soil. Therefore, in the crop rotation, the pumpkin family should be sown after 3 years, which is more likely to fight the disease is an effective method.



Figure 10. Symptoms of fusarium wilt, which sometimes occur on the pumpkin

2.7. Fusarium wilts disease of cucurbitaceous

The disease is found in watermelons, in the cucumber and in melon which belongs to the pumpkin family. Fungal melon crops that cause disease - reveals according to the kinds of cucurbitaceous. Mushrooms in each crop a certain sexually transmitted disease occurs. Cucumber fungus is *Fusarium oxysporum f.sp. cucumerinum*. Melon's disease mushrooms are *Fusarium oxysporum f.sp. melonis* reveals 4 sexes. In watermelon, 3 levels of mushroom - *Fusarium oxysporum f.sp.* causes disease. Cucurbitaceous are able to take determined sexes of fungal. In young seedlings of an infected plant, the disease occurs in the seed part and begins to turn yellow and first formed occurs in tissues. So the young seedling dies. The plant darkens and withers. In adult plants, branches swell quickly. As a result, the plant dries up completely. On one side of melon and watermelon thread, often dark brown spots are formed and spread throughout the stem. With the soil of the spotted crop occurs at the point of contact. Melon, watermelon stalk disease- yellow, orange and yellow in the texture of the pipelines you can see the light color. Fusariosis fungus that causes leprosy maintains its activity in the soil for many years. Mushroom spores are infected with agricultural

machinery and disease spreads through plants. Fusariosis spreads through water droplets, from soil particles, and crops. The fungus infects the plant through the roots of the cucurbitaceous. When the soil temperature is normal for the activity of the fungus then it occurs.



Figure 11. Fusariosis wilt of cucurbitaceous (numb)

Control measures. We must plant disease-resistant varieties of fusariosis. The soil moisture in the areas where melons are planted should be at the level of 6.5. The soil should be fertilized with nitrogen. The soils must be steamed.

2.8. Black rottenness of cucurbitaceous stalks

The black rottenness damages the roots of the plants which belong to the pumpkin family. *Mycosphaeraella melonis* mushroom is disease mushroom. If the black rottenness of stem occurs at the foot of the seed part, young seedlings dry out quickly. Symptoms of the disease in adult plants, first, form dark round spots in leaves in 5 mm. The edges of the spots are yellow, and then the spots dry out with the bark and if you shake the plant, the leaves fall off. The disease usually affects the center of the leaf, first of all occurs in a straightforward manner. Wounds, on the other hand, appear and a small circle of water with reddish-brown glue stained images are formed. In the end, it's all about the disease spreads out and causes the crop to dry out. If there are signs of disease in the tissues of the crop, the angel's small black fruit bodies are formed. Stains are green and with an increase in size become brown. The fungus is a diseased plant until the next growth period stored in

waste and weeds. It can spread again by seed. Diseases in older plants are mainly caused by plant wounds, when the branches are pruned, when the crop is harvested, the insects occur with side effects. Also in greenhouse conditions low night temperatures and high humidity for the spread of the disease can be a convenient condition. Infection during the flowering period of crops rotting quickly when the fruits formed with it are sold in the markets leads to an increase.

Control measures. Healing of melon crops it is more convenient to sterilize the soils of bread. Crop rotation must be used. It is necessary to regulate of rainfall irrigation. Melon crops should be treated with fungicides from time to time.



Figure 12. Black rottenness of pumpkin stalk

2.9. Phytophthora rottenness of the root of cucurbitaceous

Root phytophthora occurs in cucurbitaceous which belong to the pumpkin family. *Phytophthora capsica* and *Phytophthora* mushrooms can create this disease. The disease is found everywhere. Young saplings are wilted in root rottenness.

Cucurbitaceous do not have early growth in cool air. In some crops, symptoms occur suddenly near the time when the crop is formed in the middle of the period. There are no symptoms in the appearance of melon crops and does not come out and suddenly fades without changing color. The upper part of the stem turns black or brown on the surface of the soil and the branch dries up. In the root, a soft watery rottenness appears and its color is yellow or brown. It is often heatless. Excess moisture, poor drainage and high temperatures increase the opportunity of disease.



Figure 13. Phytophthora rottenness of the root of cucurbitaceous

Control measures. In the control measure of phytophthora rottenness of cucurbitaceous the soil moisture levels must be normal and the soil should always be kept soft. Agricultural land - caches should be drawn to improve drainage.

2.10. Cucumber's cladosporiosis

Cladosporiosis causes severe damage to cucumbers. It occurs in other plants such as pumpkins, melons, and gokterneks. Tired creator mushroom is the *Cladosporium cucumerinum*. Cucumber's cladosporiosis' symptoms are brown watery spots on the leaves. The edge of the stain is yellow.

When the disease occurs in the tissues, the area is diluted. The distance between the joints of diseased plants is short and the mosaic of

cucumbers looks like a disease. No melody is formed in the damaged tissue. gi is possible. Its color can range from gray to olive. Cucumber cladosporiosis can be found in the humus part, in stem, on the leaf, and on the crop. It may occur also watery in the newly formed crop of melon crops spots. It is affected by the increase in yield also grows and begins to mingle deeply. Eventually the spots have yellowish brown color and do not have a definite shape. On top of the hard cut, it is usually a brownish liquid is formed. In wet weather, the surface of the crop is soft olive-colored. In melons the cladosporiosis of cucumber occur on the spot and on the fruit tree. The disease does not penetrate deep into the melon and is porous. Cucumber cladosporiosis is a diseased plant. The fungus spores can spread with the wind, insects, through the garments of the laborers who labor in the field. Also with agricultural machinery the disease spreads rapidly in cold wet weather. If the temperature is high it prevents the spread of the disease.

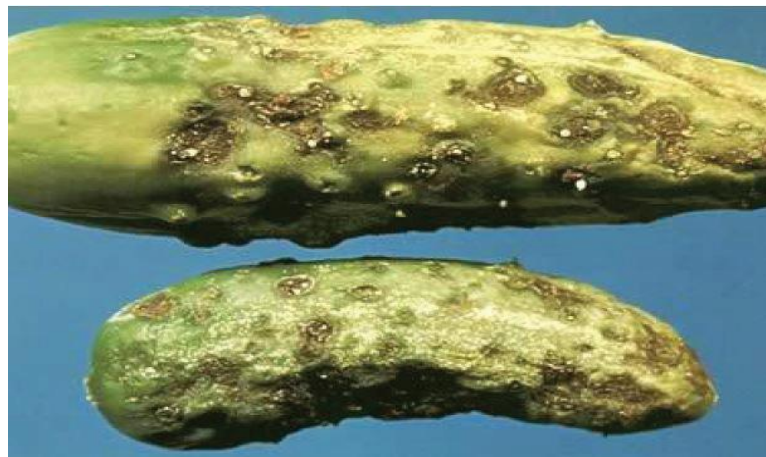


Figure 14. Cucumber's cladosporiosis

Control measures. Some kinds of plants which are resistant to fungal infections should be cultivated. Own in melon and in Gokternek (squash) should be used of fungicides. This allows the prevention of the cladosporiosis of cucumber.

2.11. Sclerotic rottenness of the stem in cucurbitaceous (white rottennes, sclerotinosis)

Sclertinia - sclerotic mushroom creates sclerotic rottenness in cucurbitaceous. It especially occurs in crops which belong to the pumpkin family. The disease affects the yield and leaves of

cucurbitaceous. In addition, in most cases, the disease occurs on the stalks of crops. Sclerotic rottenness of the stem's first sign is a mild white suppuration in the plant organ. If the central axis of the cucurbitaceous is in the case of a disease, the nucleus is disrupted and the conduit (xylem) is retained. The damaged plant is gradually yellowed and dries. When we cut the plant's stem vertically we can see the accumulated black complex of fungal sclerosis. The yield of the affected cucurbitaceous is soft and watery.

The fungus of the disease is able to live in the soil for many years at the stage of sclerosis. White rottenness can live and spread in a normal temperature and in a high humidity. Continuously irrigation, frequent rains, persistent wet days, foggy days allow for the rapid emergence of the disease. This phytopotogen mushrooms not only occur in cucurbitaceous, but also damage most household crops.

Control measures. In control measures against sclerological rottenness of the stem agro-technical measures must fully complied. It is necessary to carry out crop rotation in the fields. To not spread of the disease in the cultivation of household crops the sanitary condition should be improved. In the soils there must be deeply cultivation. Irrigation should be carried out normal until the end of the growing season. Because at that time the disease was widespread period is considered. Fumigation should be carried out on crops.

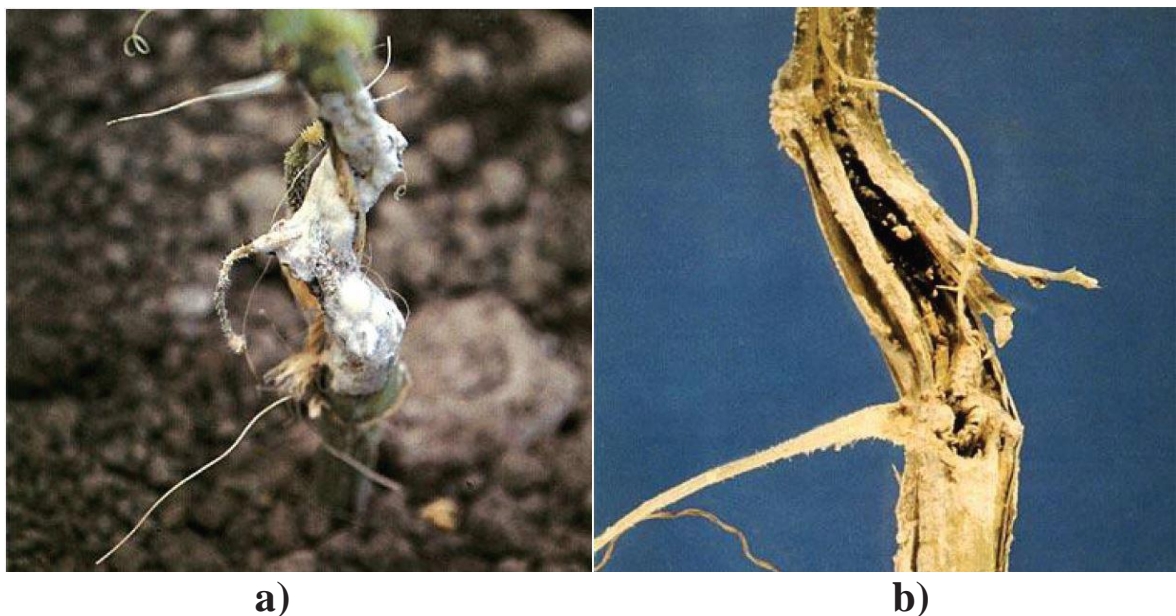


Figure 14. Sclerotic rottenness in cucurbitaceous:
a - white rottenness, b – sclerotinosis

2.12. Verticilliosis numb of cucurbitaceous

Verticillium dahliae and *Verticillium albo-atrum* mushroom creates Verticilliosis numb. The disease occurs in all crops of the pumpkin family. In the disease, first of all, leaves fade and yellow "V" formation on the edge occurs. The edges of the affected leave turn into yellow and then get dry. The plant begins to wilt from the bottom up and dries completely. The area covered by the transmission lines (xylem) when the disease is cut. Mushrooms of verticilliosis leprosy go into the soil under conditions that increase at low temperatures and mix through the root of the plant. In addition, the hot dry weather of the fungus development can also be seen. This is because after the plant produce it experiences a stress state.

This phenomenon is common in many plants can be maintained for years.



Figure 15. Verticillies numb of cucurbitaceous

Control measures. It must be complied Fumigation when growing melon crops or burning with the help of sunlight on the ground (solarium). In the fields where the verticilliosis numb spreads much there mustn't be sew the crops belonging to the pumpkin family.

3. VIRUS DISEASES OF CUCURBITACEOUS

3.1. Cucumber mosaic disease

Cucumber Mosaic Virus CMV is a creator of the disease. Currently many places are known. The application of this disease of melon crops is high. But it rarely causes watermelon damage.

The first signs of mosaic disease appear on young leaves. The edge of the leaf is twisted and deformed and folded and measured. The growth of the melon crop is reduced and the spacing of the joints is shortened, because the area of the size of the crop is small, chaotic and stagnant. Virus the disease discolors the cucumber crop. That is, cucumber dissolved in salt looks like. The virus appeared in the second half of the developmental period. The stems of the plant grow normally, only the surface of the cucumber crop it is rough and deformed. Cucumbers have a lot of mosaic disease found in plants. The disease is especially prevalent in weeds can be stored in plants and other agricultural crops. The mosaic virus is spread by juices. If there are collected crops several times in arable farmland, there is a possibility that the Cucumber mosaic will spread widely.



Figure 16. Mosaic disease of cucumber fruit

Control measures. Cucumber-resistant varieties must be sewed, which was the intermediate host of the virus in the agricultural fields,

must be cleaned of perennial weeds. In addition, Perennial crops are not planted in the fields near them. To keep the population of insect-borne pathogens insecticides to a certain extent should be applied to plants.

3.2. Mosaic disease of Gokternek (vegetable marrow)

Squash Mosaic virus creates the disease. Mosaic disease of Gokternek damages melons, blueberries, and pumpkins. But one strain of the virus is also on the watermelon mosaic disease reveals. Viral toxins that cause mosaic disease if hums are planted, the first and second leaves of the young seedling of the plant the veins are in a jagged form. On newly emerging leaves symptoms may not occur. But the yellow spots, whitish veins, bubbles are formed, and the leaves are strongly deformed. The diseased plant lags behind in growth, with less branching. The harvest occurs in small quantities. Weak spots on melon crops are formed and strongly deformed. The hearth of the virus is sick can be seeds. There were also rodent insects leaf-eaters and locusts are virus transmitters.



Figure 17. Mosaic disease of cucumbers leaf

Control measures. To prevent Gokternek's mosaic disease use only non-infected seeds.

3.3. Watermelon's mosaic disease

Watermelon Mosaic Virus-2, WMV smallpox virus can create the disease. It occurs in melon crops, legumes, and in some weeds. The first

signs of watermelon mosaic are leaf veins-the tissues between the veins are yellowed and change the shape of the leaf. The large veins of the leaf are thinner. On the newly formed leaves, the nicks appear and are deformed, covered with bubbles. Sick the height of the plant lags behind in growth. See the yield of melon crops. The color is not normal and discolored. The watermelon mosaic virus' main sources are weeds and legumes. Also juices and mining power and short-winged humans have been affected by the virus propagate through plants. A village when a virus hits a field can be spread through household appliances, staff and insects. The virus increases during the growing season of the plant.



Figure 18. Mosaic disease of watermelon leaf

Control measures. In the fight against watermelon mosaic disease mulch and mineral oils serve as a useful remedy. They get sick reduces damage. Use of insecticides on melon crops prevents the spread of the disease within the farmland. Melon crops should not be allowed to be planted in one place for a long time. Weed control measures should be taken in the fields.

3.4. Pumpkin's yellow mosaic disease

The disease is *caused by the Zucchini Yellow mosaic Virus, the ZYMV virus*. Pumpkin's yellow mosaic disease occurs in all melon crops come out. In the external symptoms of the disease, the color of the leaves is yellow, they are covered with bubbles. The outside of the crop is rugged and well-known an appearance disappears. The affected plant

is stronger than growth lags behind. The viral disease of melon crops is spread through juices. Weeds and melons belong to the pumpkin family is a source of storage and distribution.



Figure 19. Pumpkin's yellow mosaic disease

Control measures. Weed fields were cleared of weeds. Numerical increase in juices during the growing season should be limited. At the beginning of the growing season of melon crops mineral oils and mulch to prevent infections should be used.

4. DISEASES CAUSED BY NEMATODES IN CUCURBITACEOUS

4.1. Nematode (Gallogelminitosis, phytoelminitosis)

Meloidogyne incognita and other kinds of it create the disease. The disease occurs in all cucurbitaceous. The garden plant with nematode disease appears to be left-handed. The general development of the melon crop lags behind. The color of the leaf is dark green and yellow. The plant blooms and its water absorption decreases. In most cases, nematode plants dry out, but the plant does not to crops that maintain difficulty living until the end of the growing season can also be encountered. Quantity and quality of harvest in nematode decrease. When the plant is rooted out of the soil, the magics are visible. They are

the foreskin caused by nematodes. After the nematodes are damaged, the plant is exposed to phytopotogenic bacteria.



Figure 20. Nematode of cucurbitaceous

Damages of nematodes to crops are higher in mild, sandy and temperate soils. These pests have been in the soil for many years can be retained. In addition, nematodes they spread with fluency water.

Control measures. Fumigation and sterilization against gal nematode is considered to be the main effective method. In the fields with agro-technical rules must be carried out the depth cultivated agricultural crop rotation with measures. Crop cleaning of weeds from nematode in their grains yields has high results.

4.2. Other diseases caused by nematodes

The *Belonolaimus* genus (needles nematode *Sting Nematode*) nematode species, *Pratylenchus* genus Root Sahara root lesion or *Meadow Nematode* species and *Trichodorus* genus species have a *dwarf tip* of the root (*Stubby Root nematode*) in the *reproductive* nematode and the nematode of the *Pratylenchus* genus (*Pin nematode*) also types. *Belonolaimus* nematode farms in some places of round undeveloped pale plants can be seen in the set. According the increase in the number of nematode plants they began to occur in the central part of the field too. They occur on leaves that form the first signs of vegetation. That is

the edges of the leaves dry up and becomes oriented towards adultery. The young roots are brown and form first brown lines appear on the roots, and the nematodes can be free in the long run. *Pratylenchus* root nematode does not cause much economic damage. But the nematodes mushrooms and bacteria in areas where cookies have been damaged encounter and quickly diagnose symptoms. In some crops no no symptoms of the disease appear. Because it is a nematode in plants valleys multiply and increase their populations.

***Trichodorus* and *pratylenchus* nematode** species of nutritious reduce the number of roots. They slow down the growth of the roots and the height of the plant is also shortened. Also general yellowing occurs, nematode plants rarely dry out. Nematodes are not harvested in cucurbitaceous. Nematodes are mainly occurring in weeds in moist air in moist soils.



Figure 21. The root of a cucurbitaceous damaged by nematode

Control measures. Air in the fight against nematodes moisture content should be taken into account and regular monitoring and should monitor the supply of nutrients. This reduces the level of damage to the

cucurbitaceous of nematodes. Nematode - Horticultural crops have been developed with democides to reduce the number of mail. Weeds are the main source of reproduction of nematodes. That is why weeds should be destroyed.

5. PARASITE PLANTS THAT CAUSE DISEASE IN CUCURBITACEOUS

5.1. Yellow scratch



Figure 23. Yellow scratch

Parasite plants cause disease in cucurbitaceous. The causative agent is *the* relevant of parasite plant species of the *Cuscuta* genus. In cucurbitaceous the yellow scratch is found in the form of a contaminated plant-shaped plant. Over time, it spread to other parts of the field. Cucurbitaceous are yellow in the planted areas. Yellow the shrub has small unusual white flowers. After maturing it becomes a cage and a place where thousands of seeds are stored. Yellow light exercise

damages many plants. The seeds of the yellow shrub spread by clinging to agricultural machinery and their equipment. The seeds of the yellow spruce are green in the first year. It can also be kept in the soil for many years. The parasite can live without plants for two weeks after germination. Clinging of melon crops remove the nutrients from the stem absorbs.

Control measures. A plant from the most common areas of yellow shrubs should be removed and should burn. Herbicides should be used before planting. This prevents the spread of yellow stalks.

6. NON-INFECTIOUS DISEASES IN CUCURBITACEOUS

6.1. Diseases caused by air pollution

Various diseases due to air pollution in cucurbitaceous occurrence is ubiquitous. According to the air pollution the ozone and sulfur dioxide belong to the pathogens of disease. External if the plant is damaged as a result of environmental pollution, the quantity and quality of the syllabus is declining.

Ozone. This substance causes great damage to cucurbitaceous. Watermelon and gourd (zucchini) is considered more intolerant of ozone. The first signs of damage to cucurbitaceous are aging formed on the surface of the leaves. Of the veins of the leaves tissue-like yellowing occurs in the tissue between. This is the garden chlorophyll in the leaves of the crop and the signs of chlorosis. Also leads to the chlorinated part of the leaf turns brown.

Ozone gas is formed by the interaction of sunlight with combustible gases is coming. Often, in large cities with high ozone emissions it is formed in a large quantity. The polluted air is far from the source of formation spreads rapidly to distances. Ozone gas is used by plants is slowly absorbed.

Sulfur with a double oxide. Sub lethal regulation of sulfur dioxide the edges of the leaf of the cucurbitaceous if it has a long lasting effect and the intervals between the leaf veins are yellowed. They lost their land. If severe damage is caused, the edges of the leaves and veins necrosis occurs between the rings. Necrotic leaf both sides are known. The young leaves are unstable to double oxide of the tower. However, the newly formed leaves are stable. The sulfur dioxide is oil and gas

occurs when products are burned. This oxide is strongly moist and high formed at temperature.



Figure 24. The occurrence of network-shaped jaundice as a result of air pollution on the leaves of the melon crop

Control measures. In the control measures against ozone, sulfur and other harmful gases it will be better if there have been planted sustainable plants and crops this disease.

6.2. Diseases occur in deficiency of nutrients

In lacks of micro and macro elements in cucurbitaceous various diseases can be occur. Plants are malnourished can be found on the ground.

Deficiency of **nitrogen** element leads to general yellowing. Yellowing begins with old aging leaves. The leaves gradually dry up. The size of the cucumber crop is shrinking. The three ends of the crop the place where the rap is attached to the flower are sharpened. The size of the melon is shrinking. The stone is yellow and the seeds are small.

In the absence of a **phosphorus** element, their joints are shortened and the plant lags behind in growth. The leaf veins and leaf stalks turn red purple.

In the absence of a **potassium** element, young leaves are cup-shaped. The color of the cucumber is brown, spotted and becomes slippery. The flesh of the melon is sliced and the taste is bitter.

The first leaf formed in the absence of a **magnesium** element and the tissues between the veins are also yellowed.



a)



b)



c)



d)



e)



f)

Figure 25. Diseases that occur on the leaves of cucurbitaceous due to a lack of nutrients:

a - iron deficiency; b - calcium deficiency; ç - manganese deficiency; d - nitrogen deficiency; e - potassium deficiency; ä - molybdenum deficiency

In the absence of **boron** the growth points are stopped and dried. Spots appear on the leaves. But the veins of the leaves are green does not lose color. The newly formed leaves are twisted and they spill.

In the absence of an iron element, the distance between the leaf veins the tissues are yellow, but the leaves retains color.

In the absence of a calcium element, the size of the leaves increases. May, the edge is twisted downwards.

Defects in the manganese element occur and the tissues between the veins of the young leaves are yellowed.

Molybdenum - the veins of the first (old) formed leaves, between the tissues becomes yellow and the edges of the leaves are brown. The plant remains in growth.

Conditions that determine the nutrient deficiency of melon crops one is the lack of chemical elements in strong and acidic soils. Even when over-fertilized, some other elements can be deficient.

Control measures. The norm of fertilizer application to melon crops should be planned. Soil analysis should be carried out.

6.3. Symptoms that occur in plants under adverse environmental conditions

Temperature and humidity cucurbitaceous occur the barking. In unfavorable environmental conditions the barking is common everywhere and in plants. Decrease of temperature in the crops has a detrimental effect. The growth of the plant may be retained. In addition, and the formation of yields is reduced and they become inconsistent. Watermelon and melon are unstable to low temperature. High temperature while affect them to wither. If the high temperatures last a long time it causes the edges of the lower leaves to dry out. Drought affects the melon to wither. The growth of the crop is slow and the upper part of the syllable is sharpened (*Fig.26*). If the crops are over-irrigated, they begin to wither. Damaged root water and cannot absorb nutrients. As a result, there can be seen the lacking of the mineral elements. The exacerbating conditions of the disease are mainly excess moisture occurs in heavy soils. Bad drainage and drought occur in sandy soils. So, plants are exposed to moisture and high in changes in natural conditions influences extreme temperature conditions.

Control measures. Regular irrigation rules in field conditions to be observed. If the melon crops are grown in the greenhouse the normal maintenance of the internal temperature must be monitored.



a)



b)



c)



e)

Figure 26. Symptoms that occur in plants under adverse environmental conditions

6.4. Diseases caused by pesticides

Various diseases occur when pesticides are used in melon crops. Sulfur, atrazine, tereflane and other pesticides apply chemicals that cause pathogens. Under the influence of pesticides, rhinitis can be found everywhere (*Fig . 27*).

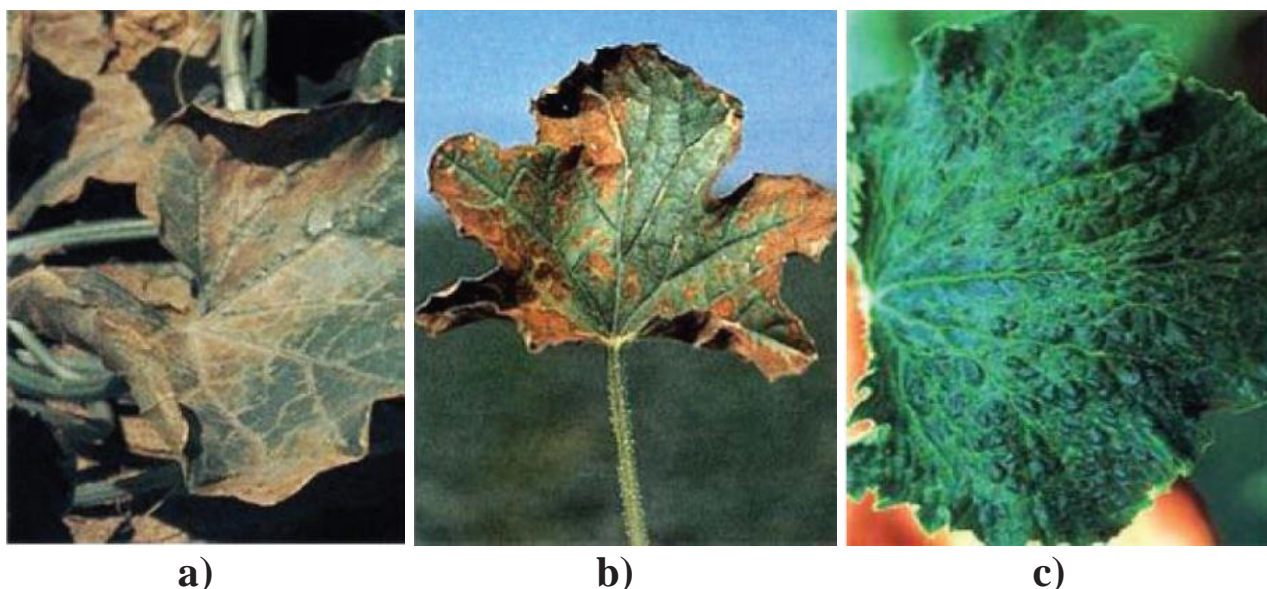


Figure 27. Occurrence of diseases under the influence of pesticides

Sulfur . Some varieties of melon are more susceptible to the effects of sulfur happens. Under the influence of sulfur, the leaves of the melon burn and the plant lag behind in development.

Atrazine . When atrazine is given in large quantities, the leaves of the plant in the plant dries up, lag behind in development.

Tereflane . Under the influence of pesticides the stem of the melon crop part of it is bent, and the growth of the root is slowed down. The plant is weak, lags behind in development.

Melon is sensitive to pesticides. Often, before the melon crop, the effect of atrazine is further enhanced when the crop is planted. Tereflane can harm when it sprinkled before the planting crops.

Control measures. In farmland, it should be used chemicals with a low volatility. In sprinkling the pesticides on crops it should be taken into account the direction of the wind during the period. In most cases, Sulfur-containing chemicals are used on normal weak days. Pesticide residues during crop rotation should be kept in the soil.

6.5. Physiological disorders in cucurbitaceous

Physiological disorders in melon crops occur under the influence of bad environment conditions. The surface of the face of harvest of melon crop and the flower are dark, and it completely lasts until the rap is over (*Fig . 28*).



Figure 28. Physiological disorders in cucurbitaceous

Bark like staining. The symptoms of this disease occur in thin-skinned melons and cucumbers. The whole place of around the melon and cucumber is made up of small brown spots. Spots like this may occur on the leaf and stem.

Sun burning. Burning. Direct sunlight white-spotted lesions occur in the groin.

Light colored staining. This physiological disorder occurs in cucumbers, the side of the cucumber touching the ground turns yellow. Diseases occur in the soil due to potassium deficiency. The disease is moist and occurs in the alternation of dry periods. In addition Potassium intake decreases with damage to the root system and leads to the spread of the disease. White spots are often encountered in crops lying in difficult moist soils. The water is released a high concentration of salts occurs. This is your epidermis causes burns. Every brown spot is a burning place. It is also the place where the water droplet is released. Sunburn and direct the fall occurs in the hot summer.

A rotten disease from the top. Large amounts of nitrogen in the soil should also be avoided, potassium should be given, mulched and ensure that humidity is maintained at all times. The yellow spot should not allow the vigorous growth of the pelican of the opposite cucumber.

This tag water should be given less in the mill; the pelican against the sun in the fall should ensure strong growth.

6.6. Diseases caused by pollution

In the absence of sufficient pollination in melon crops diseases occur. Destruction of the dust phenomenon can be found everywhere. If sufficient dusting phenomenon does not pass in Gokternek, the yield does not increase. If the Gokternek is not fully mature the crop will be brown. Gokternek dusting is appropriate otherwise, from the place where the flower is fixed or from the tip begins. Unpolluted flowers in melon crops lag behind in growth or spills. And the yield of the cucumber did not reach its normal size; the seed does not fully ripen. In addition, both sides of the crop are stretched reveals the image (*Fig.29*).

Cucumber, watermelon, Gokternek, and pumpkin plants are of the same sex and maternal flowers are special. In some varieties of cucumber, only motherhood flowers are formed. Such varieties need to be dusted. Some and in the varieties of melon crops the maturation of paternal and maternal flowers the duration is different. Here, under the influence of natural conditions, not enough paternal flowers to form. Some days the activity of the larvae is low. Decreased bee activity gin rain, high or low temperatures, various diseases of bees, and harsh weather conditions adversely affect. All of these phenomena interfere with the transport of dust grains.

Control measures. To be normal pollution in melon crops it beehives in farms.



Figure 29. Diseases that occur in the event of pollution

6.7. The damage caused by salts to cucurbitaceous

The melting of salts and melting sodium, and magnesium, chlorides, sulfates, carbonates and other salts can make harmful affect to cucurbitaceous. The harmful effects of salts on crops are everywhere. The melting of salts can be found everywhere. Excess salt is a vegetable damages the roots of their crops. The growth of plants is slow and the yield is low. Salt damage to melon crops in the case of ren, they become dark green. With healthy plants Compared to toxic leaf accumulation of salts in the plant compared causing the edges to burn. The amount of melting salt increases itself in dry climate. And waste water contains an excess of salt. To the lower layers that hold the root system of the soil these wastes are not completely washed away when washing water is given. These phenomena the drainage system occurs in bad places.

Control measures. If the system of drainage farmland works well, by the irrigating the high-saline soils, the salts can be washed from the layer where the root system is located. It improves the ameliorative condition of the soil. The use of the dripping irrigation method leads to the washing of underground salts.



a)



b)

Figure 30. Damage under the influence of salts

6.8. Diseases caused by adverse effects of sand and wind in cucurbitaceous

It causes various disturbances in sand and wind melon crops. This phenomenon is common in many parts of farmland plenty of space. In this case, the plant dries up pieces. It reveals a symptom as if torn or divides the leaves into. The surface of the cucumber crop nor does sand and wind damage the epidermis, forming small pimples come on. When cucumbers are grown in sandy soils, there is formed “sand burning”. These symptoms are caused by strong floods and winds can come out.



Figure 31. Plant diseases in a result of sand and wind damage

Control measures. It needs to create a protection zone of melon crops from the harmful effects of sand and wind. The protected areas should be placed with interval. Horticultural areas should be selected according to the mechanical composition of the soil.

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Scientific-practical manual