

# Study on Detection Methods of Common Diseases and Insect Pests and Residues in Cucumber

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**Abstract:** As a favorite vegetable, cucumber is widely cultivated. In this paper, the common diseases and pests on cucumber were briefly reviewed, the occurrence characteristics and control methods of the important diseases such as powdery mildew and downy mildew were introduced, and various detection methods were summarized in order to improve the reference for the control of cucumber diseases and pests.

**Keywords:** Cucumber, Disease, Pest, Residue, Detection.

## 1. Introduction

*Cucumis sativus* L. (*Cucumis sativus* L.), an annual climbing herb of cucurbitaceae, is an important vegetable crop, rich in protein, sugar, vitamin B2, vitamin C, vitamin E, carotene, niacin, calcium, phosphorus, iron and other nutrients. It is widely cultivated all over the world and has a long cultivation history [1].

## 2. Common Pests and Diseases on Cucumbers

Cucumbers like dampness but not waterlogging, like fertilizer but not fertilizer, often multiple downy mildew, gray mold, powdery mildew and so on.

Cucumber downy mildew is a fungal disease, its incidence in the middle and upper leaves of cucumber, in the field observation should grasp the following points, every morning at about 8, see whether there is water on the back of the leaf, polygonal plaques, whether there is gray mold layer on the plaques, if you have these three points can be diagnosed as downy mildew.

The suitable environment for the disease is the temperature of 16°C ~ 22°C, and the relative humidity is above 83%. The disease has two fears, namely fear of drying, fear of high temperature. The bacteria died naturally in 3 to 5 days after drying. In the case of large humidity in the shed, the temperature can be controlled to 45°C for 2 hours, and the disease can be easily controlled by spraying appropriate chemicals. Available from Anker, Pric, Minc, Manganzinc-frosturea, Iquazine, Jinredomir and Amisidar. In addition, in the prevention and treatment of downy mildew, it is necessary to pay attention to the simultaneous occurrence of bacterial keratosis, which can be added to the control of bacterial keratosis in the prevention and treatment of downy mildew.

Gray mold of cucumber can harm melons, leaves and stems. Most of the damaged melon first infects the fallen flowers, causing the flowers to rot, growing a light grayish-brown mildew layer, and then further infects the young melon, the damaged melon quickly becomes soft, atrophied and decomposed, and the gray and white mildew layer is closely produced on it. Most of the leaf lesions are round, nearly round to irregular, 20 ~ 50 mm in diameter, the edge of the lesions

is obvious, the surface is light reddish-brown, there is a small amount of gray mold. Stem and vine damage caused local rot, severe disease stem break, the whole plant died. Disease caused by fungal infection, the disease often occurs in the greenhouse after the winter humidity is high, the wind is not timely and the temperature is low. The temperature of about 20°C, lack of light in cloudy days, relative humidity of more than 90%, and long dew time are important conditions for the occurrence and spread of gray mold.

If the temperature is above 30°C and the relative humidity is below 90%, the disease will stop spreading. In the early stage of the disease in the protected area, 10% of Sukylin smoke agent or 45% of chlorothalonil smoke agent can be used, each time 250 grams per mu, smoked for 3 to 4 hours. It can also be used as 50% prohydne wettable powder 1500 times liquid, or 2.5% Chloroxylamine wettable powder 600 times liquid, or 50% risicron 500 times liquid, or 25% Acimediar suspension 1500 times liquid. Use the medicine once every 6 to 7 days, continuously prevent and cure 3 to 4 times, requiring the medicine to spray on the flowers and young melons.

Adding 0.1% of 50% Sukylin wettable powder or 25% of Xyla wettable powder 200 ~ 300 times the amount of liquid dipping or spraying flowers is obvious.

Cucumber powdery mildew first grows out of small round white powdery mildew on the front or back of the lower leaves, gradually expanding, thick and dense, and soon becomes a piece. At the later stage of the disease, the whole leaves were covered with white powder, then turned gray and white, and finally the leaves were yellowish brown and dry. The stem and petiole also produced similar to the leaf lesions, dense white powder mildew. In the fall, sometimes there are small yellowish-brown dots in the affected areas, which then turn black. The leaf of this disease is covered with white powder, and the lower epidermis of the mold layer remains green at the early stage of the disease, which is easy to distinguish from other leaf diseases. The appropriate temperature condition for this disease is 20 ~ 25°C, and the appropriate relative humidity is 35% ~ 45%. Therefore, the temperature and humidity requirements of white powder bacteria are not cold, not hot, not wet. Young, barren plants are susceptible to the disease. White powder bacteria are particularly sensitive to "sulfur", before planting, 1.8 kg of

sulfur powder per mu plus sawdust or other combustors are ignited and fumigated, closed and smothered for a day and night, which can kill white powder bacteria, smothered again every 3 days, and then seeded or colonized. During the growth of cucumber, the sulfur powder can be reduced by half, the time can be reduced to one night, and the smoke and flash once every 5 to 7 days, the effect is good. When the central disease plant occurs in the field, it is necessary to spray control in time, which can choose 20% triazolone wettable powder 1000 times liquid or 75% Daxide wet powder 500 ~ 600 times liquid, or 10% world high 2500 times liquid, or 2% plus 400 times liquid, etc., spray once every 5 ~ 7 days, and alternate use of pesticides. When spraying, do not neglect to spray the ground.

### 3. Residue Detection Method

At present, the main detection methods of pesticide residues on cucumber are liquid chromatography-tandem mass spectrometry, gas chromatography-mass spectrometry, gas chromatography and high performance liquid chromatography.

Huang Yongchun [2] et al. used a combination of solid phase extraction (SPE) and liquid chromatography (HPLC) to study the detection conditions of residues of difenuron, difenuron and bolubicide in cucumber. The results showed that the method was simple and easy to use. The extraction of acetonitrile was salted out and dehydrated, then 5.0mL of acetonitrile was diluted 1 times, then the volume was fixed to 4.0mL after methanol elution, and then liquid chromatography was performed for direct detection. The minimum detected concentrations of the three pesticides were 0.0143mg·kg<sup>-1</sup>, 0.0167mg·kg<sup>-1</sup>, 0.020m, respectively. The average recoveries of g·kg<sup>-1</sup>, high concentration, medium concentration and low concentration were 95.11%-99.35%, 94.00%-101.63% and 101.65%-105.15%, respectively. The coefficients of variation were 1.35%-1.84%, 3.77%-6.09% and 2.63%-8.09%, respectively.

Guo Jun et al. [3] established a high performance liquid chromatography method for the determination of myithrin residues in cucumber and soil, and the minimum detection amount of myithrin was 4×10<sup>-10</sup>g. The average recoveries of cucumber samples were 762-862% at 0.05~50mg·kg<sup>-1</sup>. The coefficient of variation was from 04 to 20%, and the lowest detected concentration was 0.02mg·kg<sup>-1</sup>. For soil samples, the average recoveries were 85.4~88.1% at 0.2~50mg·kg<sup>-1</sup>. The coefficient of variation ranged from 0.6 to 14%, and the lowest detected concentration was 0.02mg·kg<sup>-1</sup>.

Kong Xianghong et al. [4] established a method for the analysis of 23 organochlorines and pyrethroids in vegetables by solid phase extraction-capillary gas chromatography (SPE-CGC). The samples were extracted by ultrasonic wave with n-hexane as extraction agent, and then purified by Florisil solid phase extraction column. The samples were

separated by DB-35MS elastic quartz capillary gas chromatography column and detected by electron capture detector. The results showed that 23 kinds of pesticides were separated well within 25min. The recoveries (n=3) ranged from 76.0% to 110.1%, and the relative standard deviations were 0.81% to 3.28%. The lowest detection limit ranges from 0.03 to 2.06µg/kg.

In order to master the residual digestion law of chlorothalonil on cucumber, Wang Jinlian [5] et al. studied the residual digestion dynamics and final residual amount of 75% chlorothalonil wettable powder on cucumber after spraying on stems and leaves at different doses and under different cultivation conditions by field experiment and gas chromatography analysis method. The results showed that there was a great difference in the initial deposition amount of cucumber cultivated in solar greenhouse and open field, and the higher the dosage, the higher the initial deposition amount. The residual digestion conforms to the first-order kinetic equation. After 2 490 gai/hm<sup>2</sup> and 4 980 gai/hm<sup>2</sup> were sprayed on the stems and leaves, the degradation rates of the two doses were basically similar, and the half-life of the cucumber in the open field was 1.3 d and 1.4 d, respectively. The half-life of cucumber in solar greenhouse was 2.6 d and 2.8 d, respectively. The maximum residue limit (MRL) of chlorothalonil in cucumber was 5 mg/kg. The time required for pesticide residues to degrade to this value after spraying with the two concentrations was 0.5d and 1.6d for open-field cucumbers and 1.9d and 3.6d for solar greenhouse cucumbers, respectively, which met the quality and safety standards of vegetables, providing a theoretical basis for scientific and rational use of chlorothalonil in open-field and solar greenhouse vegetables and similar areas.

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