DISEASE MANAGEMENT OF CROPS AND HORTICULTURE PLANT

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Plant Protection Departement

ICAT Ketindan Malang Indonesia

Important Diseases

01 Rice Disease: Blast & Tungro virus

02 Banana Disease: Panama disease & Blood disease

03 Cili Disease: Curly & Gemini virus

04 Shallot Disease: Wilt Fusarium & Root Neck

05 Potato Disease: Potato leaf rot

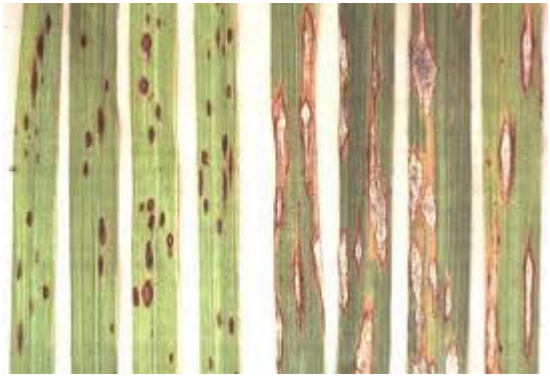
1. RICE DISEASE

1. Blast disease

2. Tungro virus

1.1. Blast disease

- **Pyricularia grisea** fungus can infect all phases of growth from nursery to near harvest.
- In the seedling phase and vegetative growth, it infects the leaves and with symptoms in the form of a rhombus-shaped brown spot called a leaf blast (a).
- In the generative growth phase, disease symptoms develop on the stem/neck of the panicle called a neck blast (b).
- The severe development of neck blast disease can reach the grain (c) and the pathogen can be carried by the grain as a seed borne pathogen.



(a)

(b)

(c)

BLAST

Biology of the fungus Pyricularia grisea

This mushroom has many races, is easy to change and forms new races quickly.

One disease cycle takes about 7 days, which starts when the spores infect and produces a spot and ends when it spores (produces new spores) which are ready to be spread into the air

One spot produces hundreds to thousands of spores in one night and can continue to produce spores for more than 20 days...

BLAS

Ecology of the fungus Pyricularia grisea

Mushrooms like conditions of long dew periods, high humidity and night temperatures around 22–25 ^{O}C.

Other supporting factors:

1. Excessive application of N fertilizers, nitrogen affects epidermal cells so that there is an increase in cell wall permeability and a decrease in levels of silica (Si) elements, so that fungi are easier to penetrate. The Si element helps the hardness and straightness of the leaves
2. Soil under aerobic conditions and drought stress.

The primary inoculum source of blast disease in the field is straw.
In the tropics the source of the inoculum is always present throughout the year because spores are present in the air and an alternative host plant other than rice.

CONTROL

1. Technical culture

1. Healthy Seed Planting

a. Infected plants are not recommended for use as seeds.
b. Treat seeds with a systemic fungicide such as Trisikazole at a formulation dose of 3-5 g/kilogram.

2. Soaking the seeds

a. The seeds are soaked in a fungicide solution for 24 hours, and during the soaking period, the solution is stirred evenly every 6 hours.
b. Comparison of 1: 2 seed weight and volume of water.

CONTROL

3. Seed coating

Soak the seeds in water, then drain them until the water doesn't drip again.
The fungicide is mixed with 1 kg of wet seeds and shaken until evenly distributed, then the grain is dried to dry, then the seeds are ready for sowing.

4. How to plant

a. The spacing is not too dense or the legowo system so that environmental conditions are not favorable for pathogens.
b. intermittent watering

5. Fertilization

Nitrogen fertilizers have a positive correlation with disease severity.
On the other hand, Potassium fertilizer causes plants to be more resistant to stress.

CONTROL

6. Planting Resistant Varieties

Several rice varieties that are resistant to several races of blast pathogens are Inpari 21, Inpari 22, Inpari 26, Inpari 27, Inpago 4, Inpago 5, Inpago 6, Inpago 7, and Inpago 8.

7. Use of Fungicides for Spraying Plants

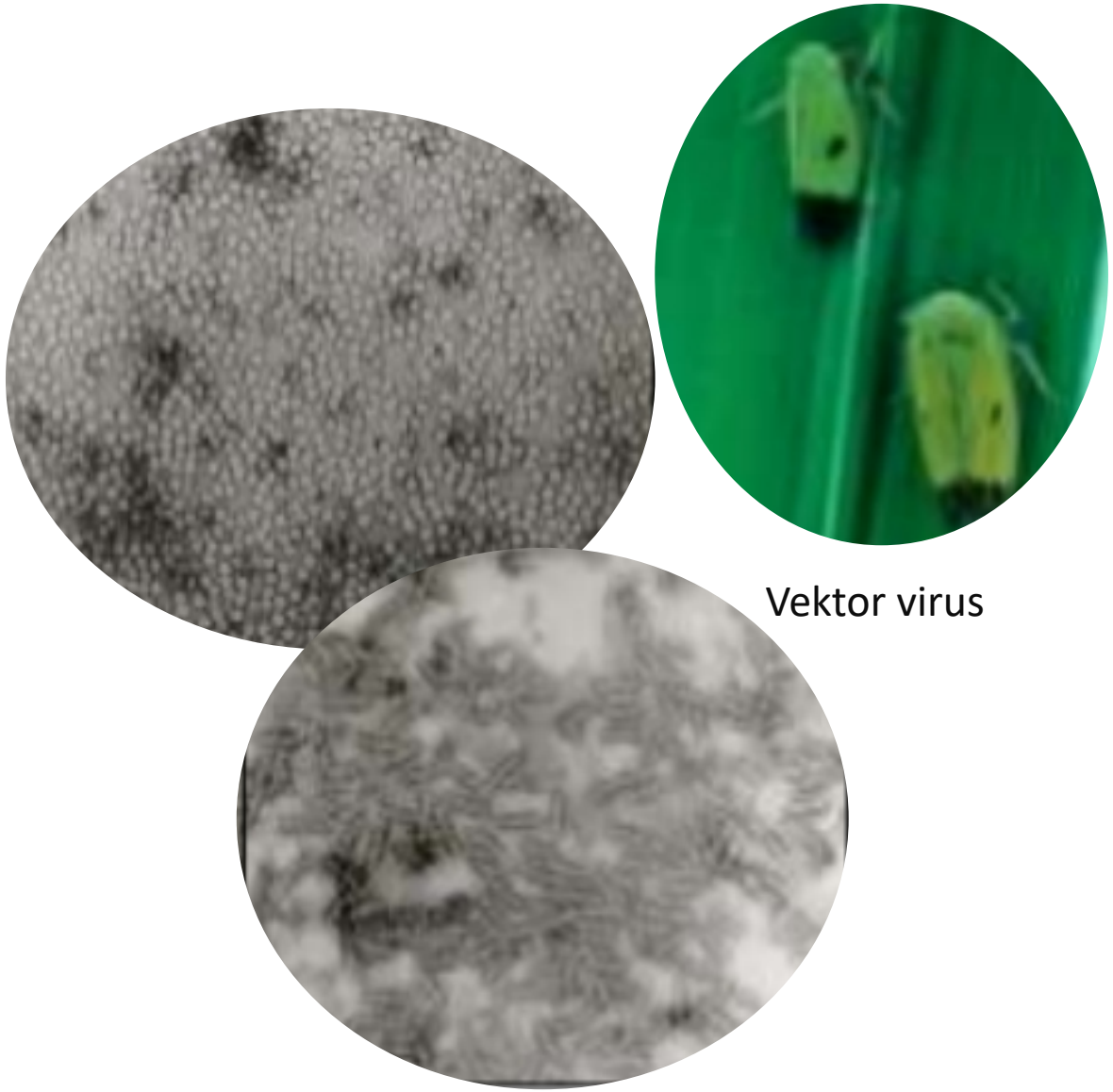
The recommended fungicides are Benomyl 50WP, Mancozeb 80%, Carbendazim 50%, isoprotiolan 40%, and trisikazole 20%.

1.2. Tungro disease

Tungro is caused by a virus which has two kinds of particle particles, namely:

1. a round shape (rice tungro spherical virus: RTSV) with a diameter of 30 nanometers

2. in the form of rods (rice tungro bacilliform virus: RTBV) with a size (150 - 350) x 35 nanometers.



Vektor virus

Symptoms of an attack:

1. there is a change in the color of the young leaves to orange yellow starting from the tips of the leaves,
2. the number of tillers is reduced,
3. stunted plants and stunted growth.

Symptoms of the disease are scattered in groups.
The plant beds look like they are bumpy due to the difference in height between healthy and infected plants.

The first symptoms generally appear as soon as one week after infection.

If the plant is protected from infection until the age of two months, then tungro disease will not cause much damage and loss of yield.

CONTROL

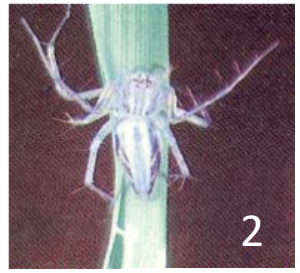
1. Environmental sanitation:

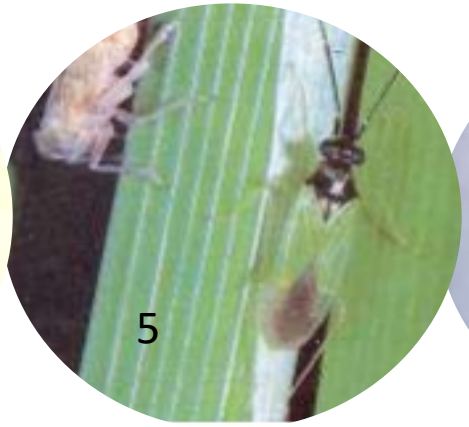
a. The source of the inoculum is the seed that grows from the scattered infected grain and diseased host grass.
b. Weeds: tree grass (Eleusine indica), duck grass or tuton (Echinochloa colonum), jajagoan (Echinochloa crusgali), juhun randan (Ischaemum rugosum), starlings or katelan grass (Dactyloctenium aegyptium), pickled grass (Paspalum distichum) and wild rice.




2. Natural enemies:

1. Wolf spider (Lycosa pseudoanulata)
2. The Bitch-Eyed Spider (Oxyopes javanus)
3. The Four Jawed Spider (Tetragnatha spp.)
4. Water Surface Ladybugs (Microvellia douglasi atrolineata)
5. Ladybug Mirid (Cyrtorhinus lividipennis)
6. Stacfilinea beetle (Paederus fuscipes)
7. Carabid beetle (Ophionea nigrofasciata)





2. Natural enemies:

8. Kinjeng Dom (Agriocnemis spp.)
9.Long Horned Grasshopper (Conocephalus longipennis)
10.Coxinelid beetle (Synharmonia octomaculata)

8

9

10 ...

3. Technical Culture

1. Plant simultaneously
   a. shorten the existence time of the source of the inoculum or
   b. breeding time.
   c. reduce the source of diseased plants and
   d. limiting the time to reproduce the vector-borne pathogens.

Simultaneous planting is recommended for a minimum area of 20 ha based on the disease gradient from one inoculum source.

2. Timely planting
   Intended to make plants avoid attack at the moment sensitive plant.
   Rice is sensitive to tungro virus infection when it is less than one month after planting.

4. Resistant varieties

a. Tungro resistant varieties: Tukad Petanu, Tukad Unda, Tukad Balian, Bondoyudo, Kalimas.

b. green planthopper resistant varieties:

- Goal T1 (Glh 1): IR20, IR30, IR26, IR46, Citarum, Serayu.
- Gol T2 (Glh 2): IR32, IR38, IR36, IR47, Semeru, Asahan, Ciliwung, Krueng Aceh, Bengawan Solo.
- Goal T3 (Glh 5): IR50, IR48, IR54, IR52, IR64.
- Goals T4 (Glh 4): IR66, IR70, IR72, IR68, Barumun, Klara.

2. Banana disease

2.1. PANAMA DISEASE
(FUSARIUM OXYSPORUM F.SP. CUBENSE/FOC)

2.2. BLOOD DISEASE BAKTERIA
(PSEUDOMONAS SOLANACEARUM)

2.1. Panama disease

(Fusarium oxysporum f.sp. cubense)

LAYU FUSARIUM/ PANAMA

(*Fusarium oxysporum* f.sp. *cubense*)

KENDALA UTAMA

- 1990-1960 : 40.000 Ha Gros michel (Amerika Selatan)
- 1986 : Cavendish (Taiwan)
- 1995 : 1000 Ha Cavendish (Halmahera)
- 1992-1997 : 1300 Ha Barangan (Sumut)
- 1992-1995 : 300 Ha Cavendish (Riau)
- 1995-2000 : 1700 Ha Cavendish (NTF Lampung)
- s/d 2010 : NAD - Papua

ecobiology

- Gardens with light shade are less susceptible to disease disturbances. Foc fungi can also survive a long time in the soil (30 years).
- Soil that has been infected is difficult to recover from this fungus.
- As primary pathogens, fungi can infect host tissue before other pathogenic fungi attack and can cause symptoms.
- As a secondary pathogen when the fungus infects the host plant after another fungal pathogen attack, so that the attack rate becomes so severe [Joffe, (1973) in Isnaini, et al. (2004)].

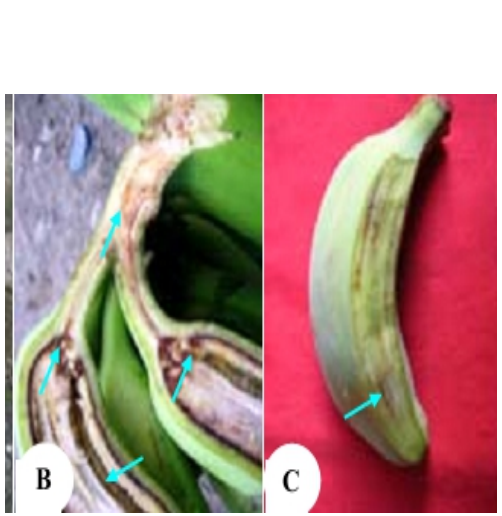
- Jenis pisang yang terserang:
- Varietas pisang ambon, cavendish, raja bulu sangat rentan.

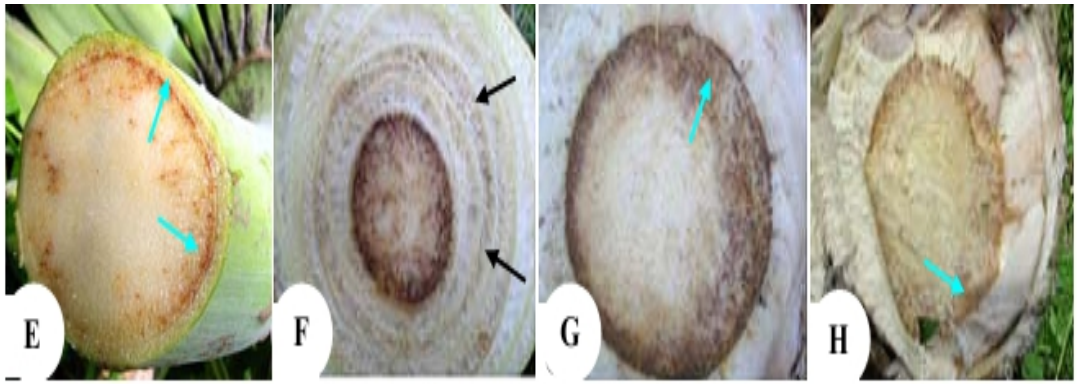
ecobiology

2.2. BLOOD DISEASE BAKTERIA
(PSEUDOMONAS SOLANACEARUM)

- The bacteria survive on diseased plant debris.
- The only host is banana n Heliconia. The Ambon n Raja banana is vulnerable, the horn stick is rather resistant
- Low saprophytic power
- Contagious via sick seeds, cutting tools, hoes and flower pollinators.
- Nematode infestation can be an entry point for bacteria.

symptom





- The leaves appear yellow, starting from the youngest leaves, the midribs, then they break and get closer to the pseudo-stem.
- When the stump or pseudo-stem is split, a white to red discharge will appear (bloody banana disease /BDB).
- If the stem is still healthy but the fruit is rotten, it means that the infection occurred through the flower / fruit.

control

1. SOAKING THE SEEDS

A. SEEDLINGS AGED 4 MONTHS FROM TISSUE CULTURE
B. SOAKED FOR ± 15 MINUTES.
C. IT IS PLANTED IN A HOLE MEASURING 25X25X25 CM WHICH HAS BEEN PREPARED 2 WEEKS BEFOREHAND.
D. PLANT HOLES ENRICHED WITH MANURE / ORGANIC.
E. WATERING THE YOUNG PLANTS EVERY EVENING 3 TIMES A WEEK.

2. Injection Rod

a. The extract solution is soaked for 1 night
b. Prepare a 12 ml syringe.
c. Inject the solution slowly at a 45 degree position.
d. The injection site is about 25 cm from the ground.

3. Root infusion

a. Prepare a 12 ml syringe and a plastic sheet of ice cream.
c. Choose a light brown root, then slit it at an angle, the root position to form a 45 ° angle.
d. Insert the root into the plastic, the root tip touching the bottom of the plastic.
e. Tie the plastic with rope, then inject the extract solution into the plastic.
f. Take care not to change the position of the roots, then cover with soil or litter.
h. Observe four days after treatment, if the solution is still left then look for other roots.



3. Cili disease

3.1. CURLY VIRUS

3.2. YELLOW VIRUS

3.1. CURLY VIRUS

- Symptoms of the attack, the virus is transmitted by aphids Myzus persicae
- Pathogen: CMV, or CVMV alone or in combination.
- Breeds by parthenogenesis and the female lays 50 eggs.
- Hosts more than 400 plants
- Characteristics: The antenna is relatively long, almost as long as the body.
- Its body is greenish yellow
- Life cycle: 7 - 10 days
- Symptoms of attack: the affected leaves become wrinkled, twist, turn yellow, wilt and eventually die.
- Is a vector of more than 150 virus strains

3.1. CURLY VIRUS

Symptoms of an attack

1. The leaves are thickened and then curled into under
2. Mosaic plants in striped color between dark green and light green.
3. Sometimes accompanied by changes in leaf shape (sunken, curly or elongated).

3.1. CURLY VIRUS

RESULTS OF FIELD APPLICATIONS

CATATAN:
1 & 3 SEBELUM APLIKASI
2 & 4 SEBELUM APLIKASI
PADA TANAMAN DEWASA

(1)

(2)

(3)

(4)

3.1. CURLY VIRUS

RESULTS OF FIELD APPLICATIONS

NOTE:
PLANTS BEFORE TRANSPLANTING

(1)

(2)

(3)

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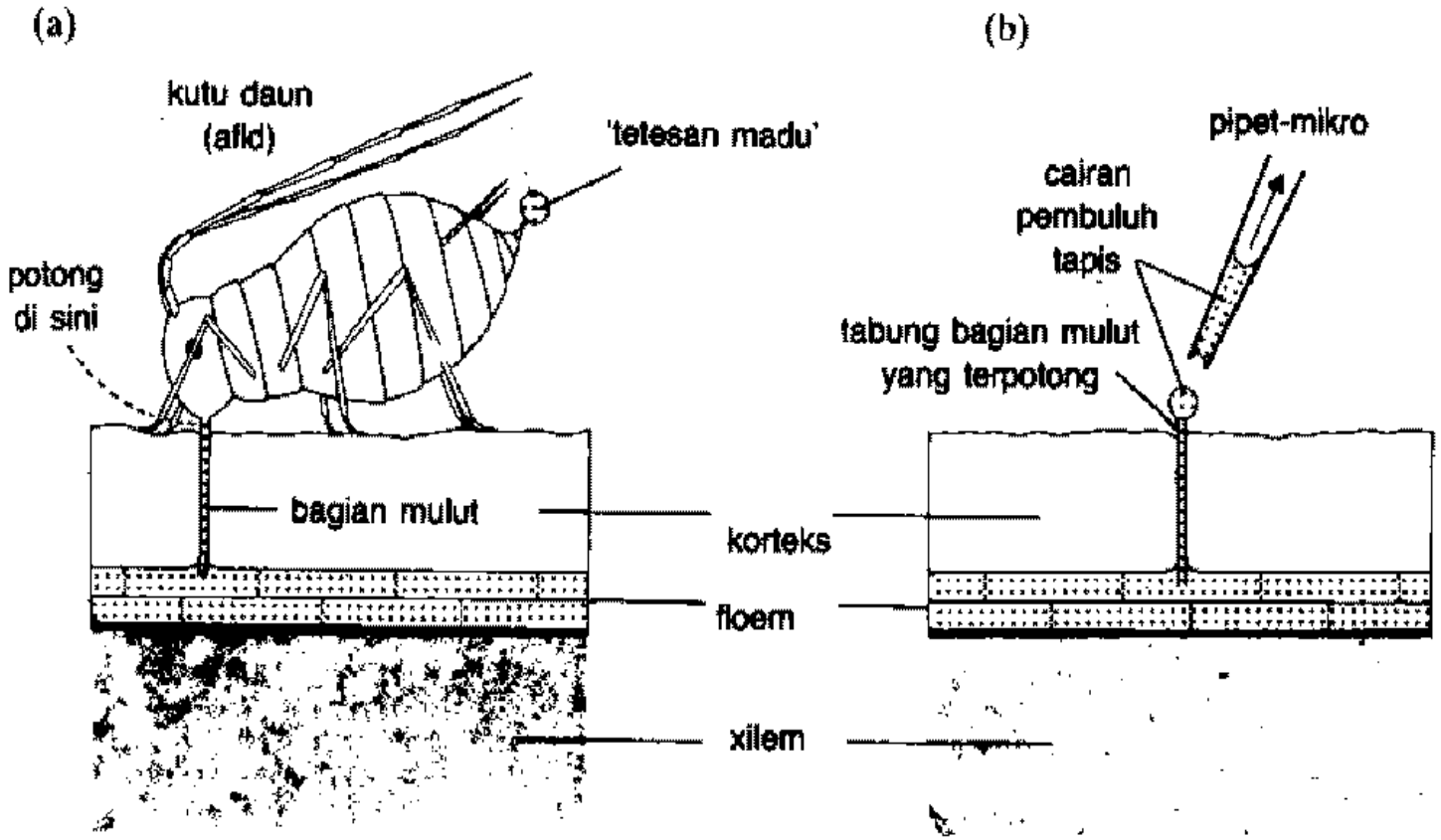
How to penetrate the mouth lice tool



The tick mouth technique obtains the fluid in the filter vessels.

In aphids that are fed (a) phloem fluid is called into the intestines and after being chemically modified, appear as honey drops.

If the mouth is cut (b) then the filter vessel fluid will come out and can be accommodated in a micro pipette (Adaptation from Ray 1972)

Host control

1. Chemically
   spraying with Curacron 500 EC and Pegasus 500SC
2. Vegetable
   combination of leaves: neem + soursop + papaya.
3. In Biology (biology)
   with the entomopathogenic fungus Beauveria bassiana

3.2. Yellow virus/gemini virus

Gemini Virus/Virus Kuning
Penyebab: Gemini virus ''PYLCV''
(Paper Yellow Leaf Curl Virus)

Vektor : Kutu Kebul (*Bemisia tabaci*)
Genus : *Bemisia*;
Species : *tabaci*.
The genus Bemisia has 37 species of
Mound and Halsey (1978)

attack symptoms

1. Damage is caused by the imago and nymphs sucking on leaf fluid, in the form of a necrotic rickshaw symptom.

2. Whitefly secretions produce honey that can be a medium for the growth of dew soot. This results in no photosynthetic process take place normally.

3. Apart from functioning as pests, whitefly can act as virus vectors.

   To date, there are 60 types of viruses transmitted by whitefly, including: Geminivirus, Closterovirus, Nepovirus, Carlavirus, Potyvirus, Rod-shape DNA Virus.

Control of the disease

Vegetable

Using OVIS vegetable pesticides in the following ways:

a. one bottle of OVIS (500 ml) is dissolved in 150 liters of water.
b. Add 3 kg of NPK fertilizer then mix until homogeneous.
c. the solution is ready to be applied.

How to apply:

1. Watering the solution in the root area of the chilies until wet as much as 100 ml -200 ml.
2. The treatment was repeated 1-2 times with a time interval of four days.
3. Best application time in the afternoon.

4. shallot disease

4.1. FUSARIUM WILT

4.2. ROOT NECK ROT

4.1. FUSARIUM WILT *(Fusarium oxysporum)*

- Pathogens are transmitted through air and water.
- Symptoms of attack are marked by the plant becoming pale, wilted, starting from the lower leaves.
- Host plants include beans, potato chilies, long beans, pumpkin, cucumber, watermelon, tomato and eggplant.
- Able to survive in the ground for 30 years.
- If carried during harvest, disease will develop in the storage area.

4.1. FUSARIUM WILT *(Fusarium oxysporum)*

1

1

3

4

4.2. ROOT NECK ROT

- Root neck rot is caused by the fungus *Botrytis allii.*
- Pathogens are transmitted through the air.
- This disease will develop rapidly in conditions of high humidity and average air temperature above 15-20^{o}C, the land is muddy and humid.
- Symptoms of attack are characterized by the plant neck softening and then rotting.
- Host plants include shallots, garlic, leeks, and other onion plants.

Potato disease

Potato leaf rot

Phytophthora infestans

The attack of the pathogenic fungus Phytophthora infestans can reduce potato production by up to 90% of total potato production in a very short time.

Phytophthora infestans, the fungus can attack leaves, stems, and tubers in the soil.
This is what causes this pathogen to be very important to control immediately.

Potato leaf rot

Phytophthora infestans

Pathogens are transmitted through air and water.

Early symptoms are wet spots on the edges or middle of the leaves.

The spots then widen and form a brown necrotic area. The spots are surrounded by white sporangium on a gray green background.

Attacks can spread to stems, stalks, tubers and fruit. The attack of this disease can develop rapidly in the rainy season with humidity around the canopy of more than 95% with temperatures around 20 degrees Celsius.

Control for Shallot n Potato

Vegetable

The use of SEGAR vegetable pesticides in the following ways:

A. One bottle FRESH (500 ml) dissolved in 150 liters of water.
b. The solution is ready to be applied.

How to apply:

1. Flush the solution in the chili rhizosper area until wet as much as 100-200 ml.
2. The treatment was repeated 1-2 times with an interval of four days.
3. The best application time is in the afternoon because the temperature is stable over a long time.

Plant Protection Laboratory
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INDONESIA

THANK YOU