Fusarium wilt

10 minutes — 10 Economically within 10 minutes from the farm

1 Technology outline

Target disease	Fusarium wilt (Fusarium spp.)
Sample target	Soil, Stem of soil surface
Specificity	95% over, Sensitivity : 95% over

2 Need for Diagnosis

- Is there a disease or not?, Check soil heathy or not, Quick and appropriate prescription through early detection of disease

3 Target disease symptoms

- When infected, wilting symptoms appear on the plant
- Browning of the conduit part when cutting the stem
- Splitting of watermelon vine stems occurs
- Strawberry leaves become shriveled and develop unpaired leaves

4 How to use

1.Soil sample

After removing the topsoil layer, place the soil around the roots in the buffer, shake well for at least 10 seconds, and let stand for 1 minute.

1.Stem of soil surface

Scrape or chop the discolored xylem(red color), place it in the buffer, shake well for at least 10 seconds, and let stand for 1 minute

2.Supernatant

After settling the soil particles, collect the supernatant. Supernatant sample layer

3.Dripping test solution

Location of test solution (100μl)

Instill 4 drops of test solution(Do not add more than 4 drops)

4.Results

Read results after 10 minutes

5.Dispose(Test completed)

Ignore results after 10 minutes

5 Control methods

- Avoid continuous cropping and be careful not to be high EC
- If the soil in sandy, use lime to increase the acidity of the soil to maintain pH 6~7
- Take care to prevent the roots from being damaged by nematodes or insects
- Pathogen soil, fresh water fill desalinated or solar disinfected to reduce the density of pathogens in the soil

Phytophthora blight

10 minutes 10 Economically within 10 minutes from the farm

1 Technology outline

Target disease	Phytophthora blight(Phytophthora spp.)
Sample target	Soil, Stem of soil surface
Specificity	95% over, Sensitivity : 95% over

2 Need for Diagnosis

- Is there a disease or not?, Check soil heathy or not, Quick and appropriate prescription through early detection of disease

3 Target disease symptoms

- Leaves, Stems, and fruits cause disease by pathogen rainwater splash
- In the case of nursery, the stems that are in contact with the ground become dark brown, narrow, and gradually dry out and die
- It is a disease transmitted by pathogens through water and spreads rapidly once it occurs
- Rootlet die, and brown or black lesions appear on roots and stems
- Diseased plants in the middle or late growth stage wilt and die

Water melon (Phytophthora capsici)

Hot pepper (P. infestans)

Potato (P. infestans)

Tomato(P. infestans)

4 How to use

5 Control method

- Take hygiene measures such as cleaning machinery and tools and removing diseased plant remains and nearby soil
- If possible, choose resistant varieties.
- Avoid using excessive irrigation water and be careful not to splash water as much as possible.
- Disinfect the recirculated nutrient solution before use.
- Drain way maintenance after raising the ridge

10 minutes 10 Economically within 10 minutes from the farm

1 Technology outline

Target disease	Bacterial wilt (Ralstonia solanacearum)
Sample target	Soil, Stem of soil surface
Specificity	95% over, Sensitivity : 95% over

2 Need for Diagnosis

- Is there a disease or not?, Check soil heathy or not, Quick and appropriate prescription through early detection of disease

3 Target disease symptoms

- Symptoms of wilting of leaves near the growing point appear as if they were scalded in hot water.
- Pathogenic bacteria infect from roots in the soil and multiply in the tylosis and block moisture movement, causing them to wilt.
- If you cut off the stem of a diseased plant, the inside will turn brown.
- It can also be transmitted through wounds caused by agricultural work.
- Occurs rapidly under high temperature and humidity conditions

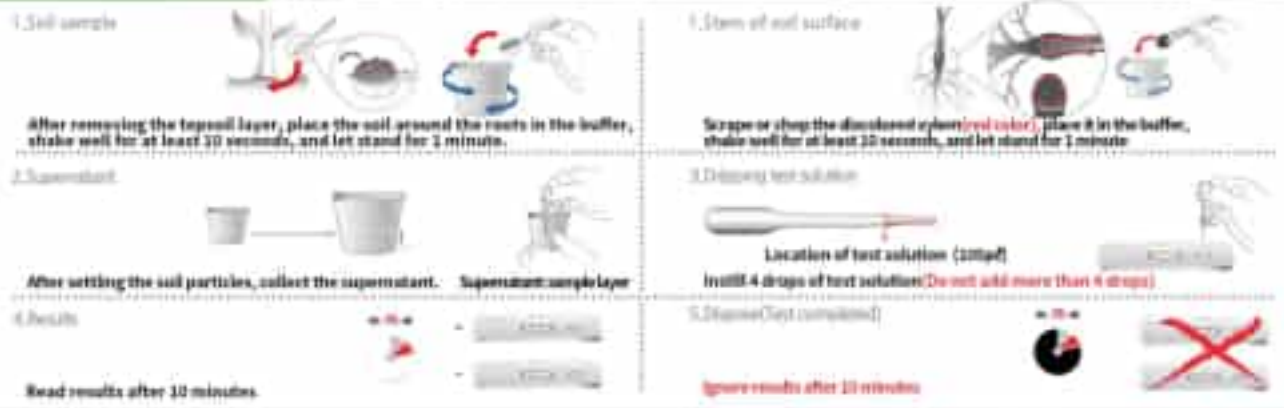
Tomato(Ralstonia solanacearum)

Egg plant

Hot pepper

SOURCE : NCPMS

4 How to use



5 Control method

- crops are rotated with other crops in fields where contamination has been severe.
- Increase the height of the ridge and to improve water drainage.
- Farms where diseases occur are disinfected using registered pesticide and treatment

Soft rot

10 minutes 10 Economically within 10 minutes from the farm

1 Technology outline

Target disease	Soft rot (Erwinia carotovora)
Sample target	Soil, Stem of soil surface
Specificity	95% over, Sensitivity : 95% over

2 Need for Diagnosis

- Is there a disease or not?, Check soil heathy or not, Quick and appropriate prescription through early detection of disease

3 Target disease symptoms

- It is one of the most damaging diseases
- It starts from the petioles or stems of the initial branch' lower leaves and quickly spreads to the leaves, eventually retreating to the inside of the stem and rotting
- If the stem and roots are damaged from the beginning, the outer leaves become severely rotted and rapidly wilt and soften
- If the dry weather continues, the rotted parts turn dark brown and bad smell

Cabbage bacterial soft rot(Erwinia carotovora)

Onion

Potato bacterial soft rot (Erwinia carotovora)

4 How to use

5 Control method

- The best measure is to prohibit repeated cultivation.
- Since cabbage is extremely susceptible to this disease, it is best not to cultivate cabbage or radish for 2 to 3 years even if it did not occur much in the previous year.
- Damage from pests must be minimized because pathogen is penetrating through traces of pest damage

Dampping off and Root rot

10 10 Economically within 10 minutes from the farm

1 Technology outline

Target disease	Dapping off and root rot (*Pythium ultimum*)
Sample target	Soil, Stem of soil surface, Root zone
Specificity	95% over, Sensitivity 95%

2 Need for Diagnosis

- Is there a disease or not?, Check soil heathy or not, Quick and appropriate prescription through early detection of disease

3 Target disease symptoms

- Use pesticides after diagnosing the soil and nursery season media
- Pathogens exist in the form of myceium or sclerotum in the tissues or soil of diseased plants
- After wintering, Pathogens germinate and invade parts of surface and underground causing disease
- It grows well in moist and poorly drained soil
- It appears as a shrinkage symptom during the nursery stage, and diseased nursery easily collapse and die




4 How to use

5 Control method

- Be careful not to keep the soil in the nursery bed too moist
- If there is concern about an outbreak, spray of registered pesticide
- Be careful not to allow the facility house and nursery bed to become to cold or hot and avoid intensive culture
- It often occurs when nitrogen in the soil is excessive
- Occurrence increases during continuous cultivation

• Anthracnose

10 minutes — Economically within 10 minutes from the farm

1 Technology outline

Target disease	Anthracnose, *Collectotrichum spp*
Sample target	Soil, Stem of soil surface, Root zone
Specificity	95% over, Sensitivity 95%

2 Need for Diagnosis

- Is there a disease or not?, Check soil heathy or not, Quick and appropriate prescription through early detection of disease

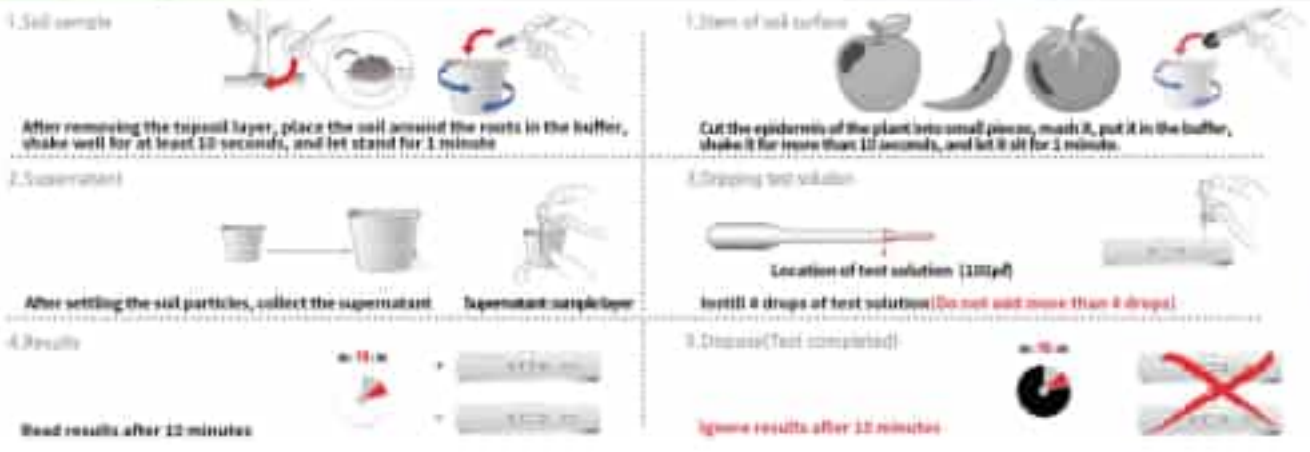
3 Target disease symptoms

- Pathogens become the primary source of infection after overwintering in the form of ascus and hyphae in diseased parts of the plant
- It can occur at temperatures between 15 and 30 degrees, and the optimal temperature is 25 degrees.
- The above-ground part of a diseased plant begins with the leaves on the infected side drying out and dying, and in severe cases, the entire plant dries up and dies.





4 How to use



5 Control method

- After diagnosis with a pre-transplant diagnostic kit, seedlings that are not diseased are transplanted
- Spray registered chemicals against anthrax at the beginning of the disease outbreak
- Elimination of potentially infectious strains, cultivation of resistant varieties, rain shading, and use of tissue cultured seedlings
- Prevent the spread of disease by removing disease remnants
- This occurs when temperature and humidity are high in facility cultivation or outdoor cultivation, so pay attention to improving the environment.

Fire Blight

10 minutes — Economically within 10 minutes from the farm

1 Technology outline

Target disease	Fire Blight (Erwinia amylovora)
Sample target	Infected part, Suspicious part
Specificity	95% over, Sensitivity : 95% over

2 Need for Diagnosis

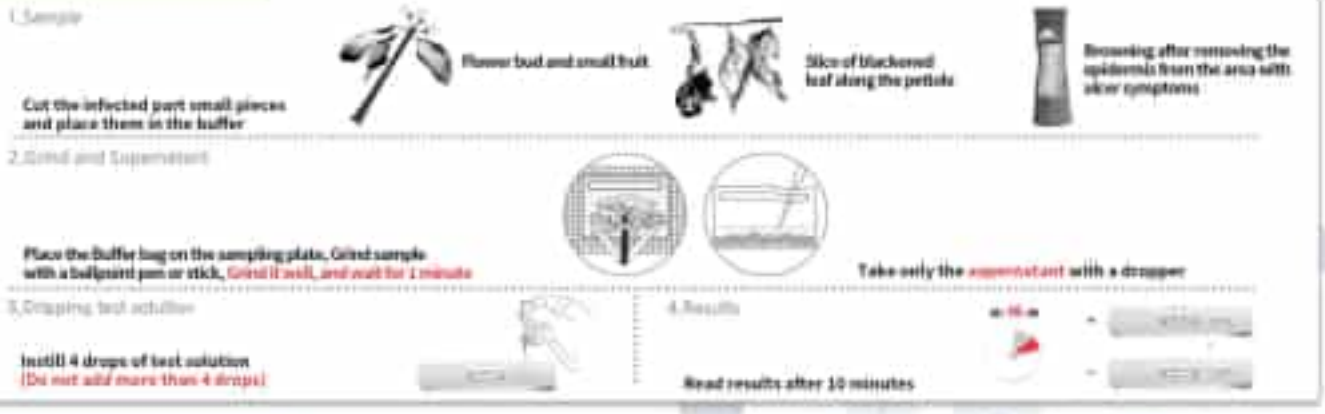
- Is there a disease or not?, Check soil heathy or not, Quick and appropriate prescription through early detection of disease

3 Target disease symptoms

- It is important to diagnose infection early.
- A plant disease caused by plant pathogenic bacteria infecting Rosaceae hosts such as apples and pears
- Tissues such as flowers, leaves, branches, stems, and fruits dry out to a dark brown color, as if they have been burned.
- It is characterized by the formation of ulcers on the trunk or branches of the tree.
- If symptoms worsen, the entire fruit tree may die

※ Show symptoms similar to Black shoot blight (Erwinia pyrifoliae)

4 How to use



5 Control method

- Among the control methods, the most important are prevention-oriented clean orchard management and the use of healthy young seedlings
  Remove potential sources of contamination pathogens by keeping the orchard and its surroundings clean.
- Clean management : To prevent the inflow of contaminants, hands, feet, gloves, hats, work clothes, etc. are thoroughly disinfected upon entering the orchard. Clean and disinfect all work tools used by soaking them in 70% ethanol for at least 5 minut

Black shoot Blight

10 minutes — Economically within 10 minutes from the farm

1 Technology outline

Target disease	Black shoot Blight (*Erwinia pyrifoliae*)
Sample target	Crops
Specificity	95% over, Sensitivity : 95% over

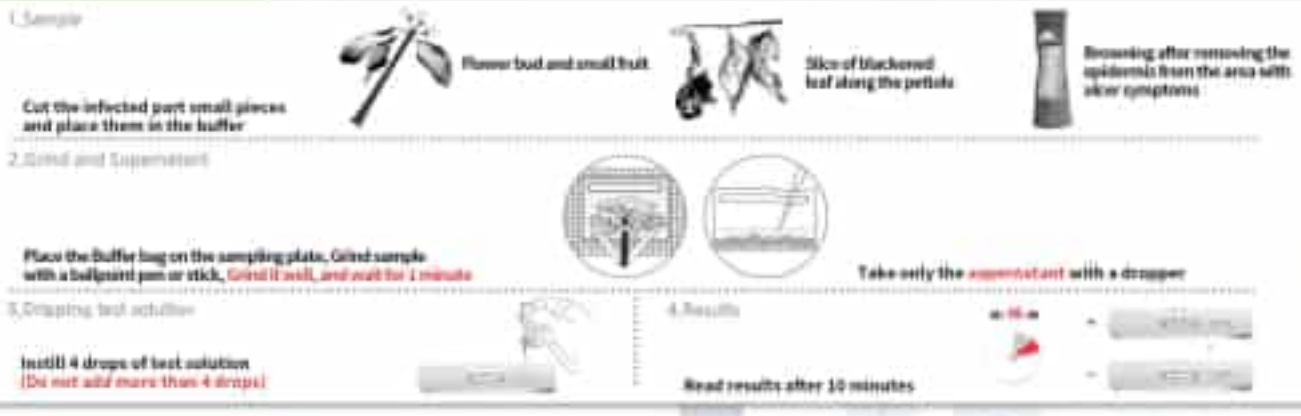
2 Need for Diagnosis

- Is there a disease or not?, Check soil heathy or not, Quick and appropriate prescription through early detection of disease

3 Target disease symptoms

- Flower: Looks like it has been boiled in water, then turns brown and spreads to the peduncle
- Young fruits: Brown discoloration and oozing as if boiled in water
- Leaves: Brown necrotic spots occur along the leaf veins on the petioles
- Stem: Spreads in water-soaked spots, and old lesions split like turtle shells

4 How to use



5 Control method

- Thoroughly carry out pest control during the flowering period and fruit drop period
- Clean orchard management: thorough disinfection of hands and feet, gloves, and work clothes to prevent the inflow of contaminants
- In the event of an outbreak, carry out thorough pest control in accordance with the Plant Quarantine Act

10 minutes — Economically within 10 minutes from the farm

1 Technology outline

Target disease	Root knot nematode (Meloidogyne incognita)
Sample target	Infected root, Suspicious part
Specificity	95% over, Sensitivity : 95% over

2 Need for Diagnosis

- Is there a disease or not?, Check soil heathy or not, Quick and appropriate prescription through early detection of disease

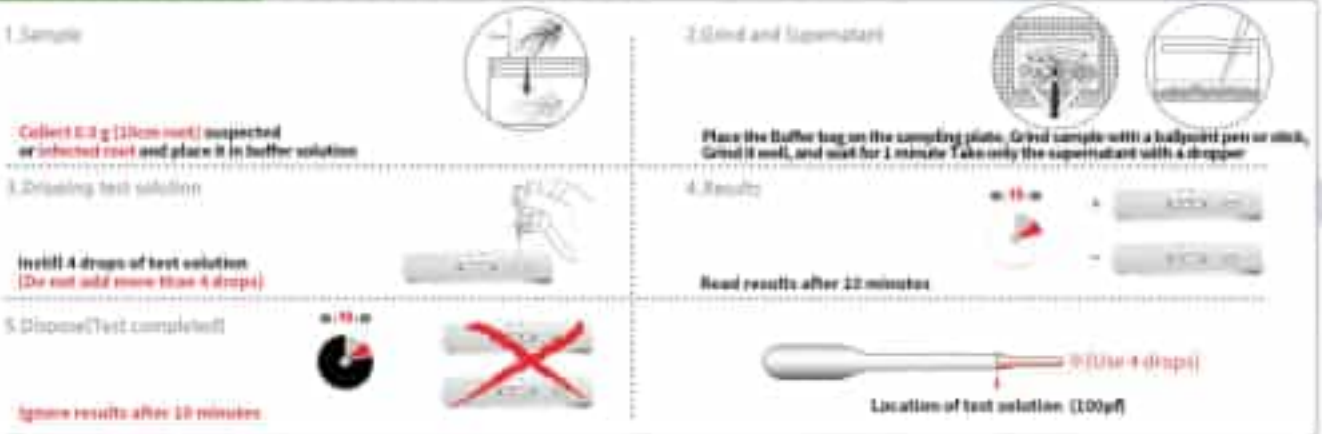
3 Target disease symptoms

- The growth of shoot system, so it does not grow well and wilts easily.
- Several large and small nodules appear on the roots.
- Larvae penetrate through the epidermis of plant roots with their stingers.
- The formation of root nodules causes trouble absorbing moisture and nutrients, inhibits crop growth due to impaired root extension, and causes crop death
- Invasion of plant pathogens into roots can cause disease.


Root knot nematode (Cucumber, melon, watermelon)


Strawberry(left : Pratylenchus penetrans, Right : Root knot)

4 How to use



5 Control method

- It mainly moves along the soil (tillage, farm equipment, agricultural products, seedlings, shoes, etc.)
- Or water must be cleaned thoroughly
- Moves very slowly through soil under its own power (1 m per 3 months)

Prevent damage and spread through early virus diagnosis

1 Technology outline

Target disease	TSWV (Tomato spotted wilt virus)
Sample target	Infected part, Suspicious part
Specificity	95% over, Sensitivity : 95% over
Insection	Thrips
Target crops	Tomato, Hot papper, Egg plant, Leaf vegetables, Potato, Peanut, soybean, Chrysanthemum

2 Need for Diagnosis

- Is there a disease or not?, Check soil heathy or not, Quick and appropriate prescription through early detection of disease

3 Target disease symptoms

- If seedlings are infected, the tissue at the tip becomes necrotic.
- Growth is slow and signs of shrinking appear.
- In the early stages of development, leaves at the tip turn light green to purple.
- During the coloration period, areas showing symptoms of the disease do not coloration and become deformed, reducing marketability.
- Thrips absorb viruses during the larva stage and they also keep virus in pupa stage in soil
- After molting, the pupa becomes a winged adult and moves to nearby crops, spreading viral diseases.

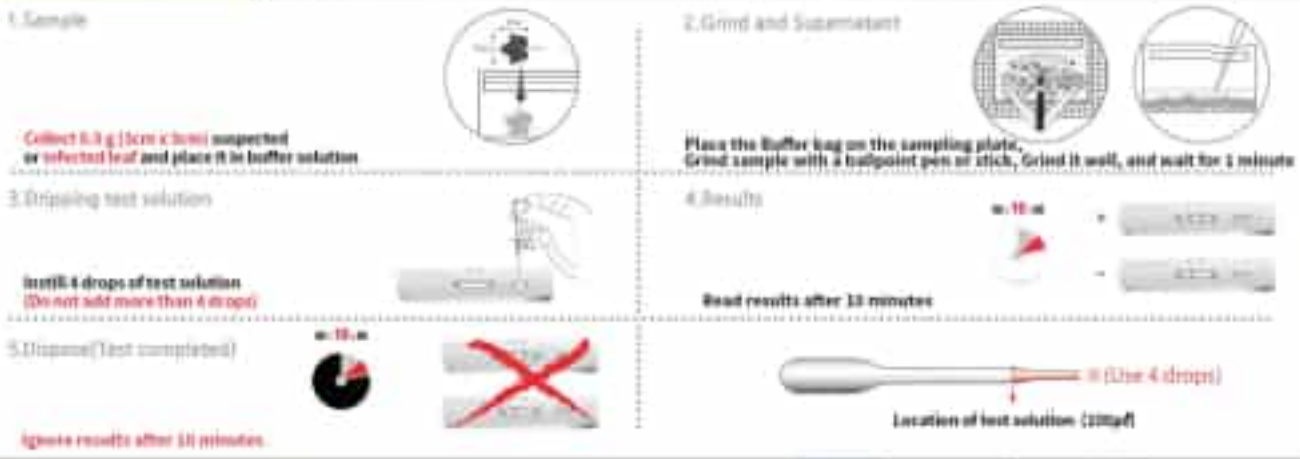

Tomato (shoot atrophy necrosis)


Tomato (stem necrosis)


Hot Pepper (Toerokking)


Tomato (roller disease)

4 How to use



5 Control method

- After diagnosis, early infected seedlings are quickly removed.
- Install insect screens to prevent thrips from entering.
- When thrips occur, weeds that serve as host plants are removed and controlled with registered pesticide
- It is important to monitor thrips using sticky traps

Prevent damage and spread through early virus diagnosis

1 Technology outline

Target disease	CMV(Cucumber mosaic virus)
Sample target	Infected part, Suspicious part
Specificity	95% over, Sensitivity : 95% over
Insection	Aphids(The disease is mainly transmitted and spread by winged aphids.)
Target crops	Over 470 types of tomatoes, peppers, etc.

2 Need for Diagnosis

- Is there a disease or not?, Check soil heathy or not, Quick and appropriate prescription through early detection of disease

3 Target disease symptoms

- It is transmitted by aphids, so it is important to prevent aphids from flying in.
- Yellow spots are formed on new leaves and small wrinkles are formed on the leaves
- As the leaves grow, yellow mosaic symptoms become more stong and the entire leaf becomes shriveled

Cucumber Pumpkin Tomato

4 How to use

5 Control method

- It is important to eliminate infected crop through rapid diagnosis at the first symptom.
- Before transplanting, test them with a diagnostic kit before planting them.
- Install netting when seedlings to prevent aphids from flying in.
- Crop rotation without growing the same crop for max three years
- Minimize diseases caused by aphids thoroughly controlling aphids well

Prevent damage and spread through early virus diagnosis

1 Technology outline

Target disease	CGMMV(Cucumber green mottle mosaic virus)
Sample target	Infected part, Suspicious part
Specificity	95% over, Sensitivity : 95% over
Infection	Soil, Seed, Contact
Target crops	Cucumber, Watermelon, melon

2 Need for Diagnosis

- Is there a disease or not?, Check soil heathy or not, Quick and appropriate prescription through early detection of disease

3 Target disease symptoms

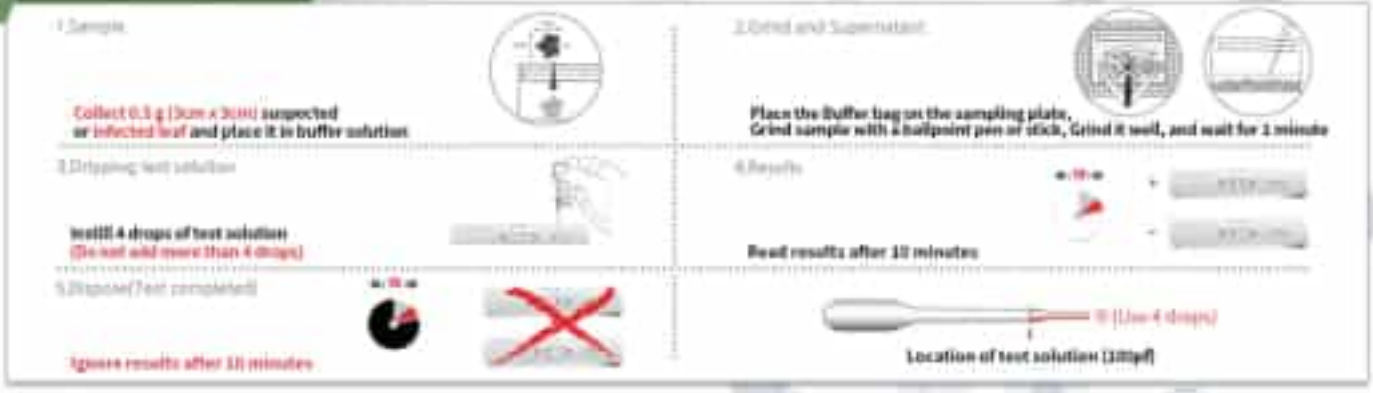
- It is a highly contagious virus and is transmitted through various methods such as seed, contact, and soil transmission
- It is easily transmitted from diseased plants, so prompt removal is important
- Young leaves appear with yellow spots, are smaller than normal leaves, and have symptoms of curling upward
- Also infected by stinging nematodes
- It exists in the remains of roots, stems, etc. in the soil and can remain for more than one year
- Infected from wounds on roots or leaves

Mosaic of leaves and fruits

Mosaic of leaves and fruits of watermelon

source : NCPMS

4 How to use



5 Control method

- It is important to eliminate infected crop through rapid diagnosis at the first symptom
- Before transplanting, test them with a diagnostic kit before planting them
- Seeds are certified seeds that have been disinfected by dry heat
- It is important to disinfect your hands and work tools when working
- Crop rotation without growing the same crop for max three years

Zucchini yellow mosaic virus(ZYMV)

Prevent damage and spread through early virus diagnosis

1 Technology outline

Target disease	*Zucchini yellow mosaic virus*(ZYMV)
Sample target	Inspected part, Suspicious part
Specificity	95% over, Sensitivity : 95%
Insection	Aphids(Myzus persicae),Saptransmission, Seed transmission (1~5)
Target crops	Melon, Watermelon, pumpkin, Zucchini etc.

2 Need for Diagnosis

- Is there a disease or not?, Check soil heathy or not, Quick and appropriate prescription through early detection of disease

3 Target disease symptoms

- Some of the veins of infected leaves turn translucent.
- The veins on the lower part of the leaf are discolored into a net shape.
- The entire leaf is mottled and dark green blisters form on the leaf surface.
- A mosaic appears and the edges of the leaves are serrated, a symptom of deformity.
- Nodules are formed on the fruit or malformed fruits occur.




4 How to use

5 Control method

- AAfter diagnosing before transplanting the seedlings, prompt removal of infected plants is essential.
- Rapid aphid control is essential with registered chemicals.
- Thoroughly blocks virus-borne aphids flying from inside and outside the house
- Keep your surroundings clean
- Removal of weeds that serve as a habitat for aphids inside and outside the house

Prevent damage and spread through early virus diagnosis

1 Technology outline

Target disease	*Melon necrotic spot virus (MNSV)*
Sample target	Inspected part, Suspicious part
Specificity	95% over, Sensitivity 95%
Infection	Olpidium Bomovanus and Cucumber beetle and Banded cucumber beetle
Target crops	Melon, Watermelon, Cucumber etc.

2 Need for Diagnosis

- Is there a disease or not?, Check soil heathy or not, Quick and appropriate prescription through early detection of disease

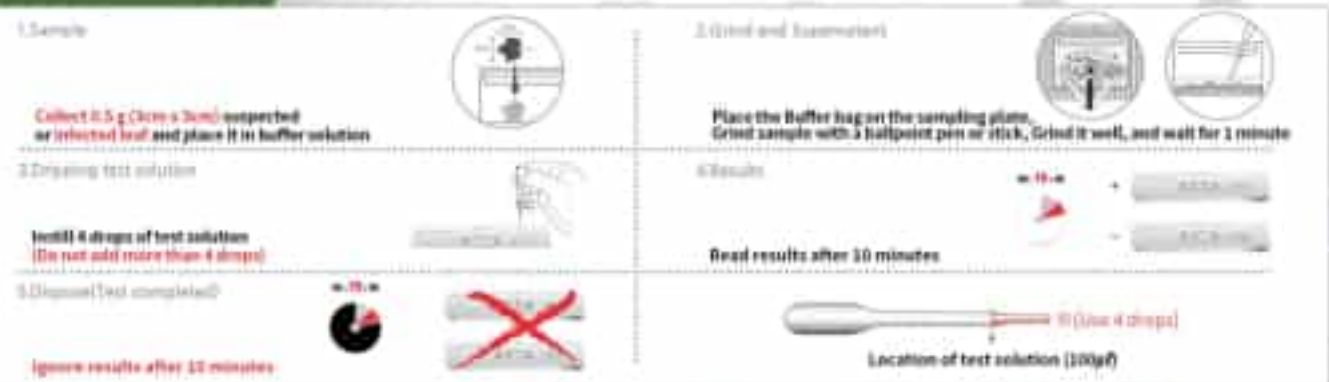
3 Target disease symptoms

- It is easily sap-transmission during tasks such as tapping
- It mainly causes yellowing, necrotic spots, leaf wilting, fruit rot, and plant death
- Watermelon : Leaf spots, leaf vein necrosis, petiole necrosis, vine necrosis, leaf atrophy and necrosis,
- brown spots on watermelon flesh
- Melon : Leaf necrosis, yellow spots, yellowing, leaf curl, leaf necrosis, yellow spots, poor fruit enlargement





4 How to use



5 Control method

- MNSV is biologically very stable, remaining infectious in soil for years
- If you use MNSV-infected seeds, there is a possibility that you may ne infected with MNSV
- Symptoms are more likely to appear below 20 ℃, but as the temperature rises, the symptoms weaken
- Use of virus-free seedlings, Removal of infected strains and disinfection of soil
- Use disinfecting scissors when cleaning

Prevent damage and spread through early virus diagnosis

1 Technology outline

Target disease	BBWV2(Broad bean wilt virus2)
Sample target	Infected part, Suspicious part
Specificity	95% over, Sensitivity : 95% over
Infection	Crop juice, aphids
Target crops	Hot pepper, Soybean, spinach, Lily

2 Need for Diagnosis

- Is there a disease or not?, Check soil heathy or not, Quick and appropriate prescription through early detection of disease

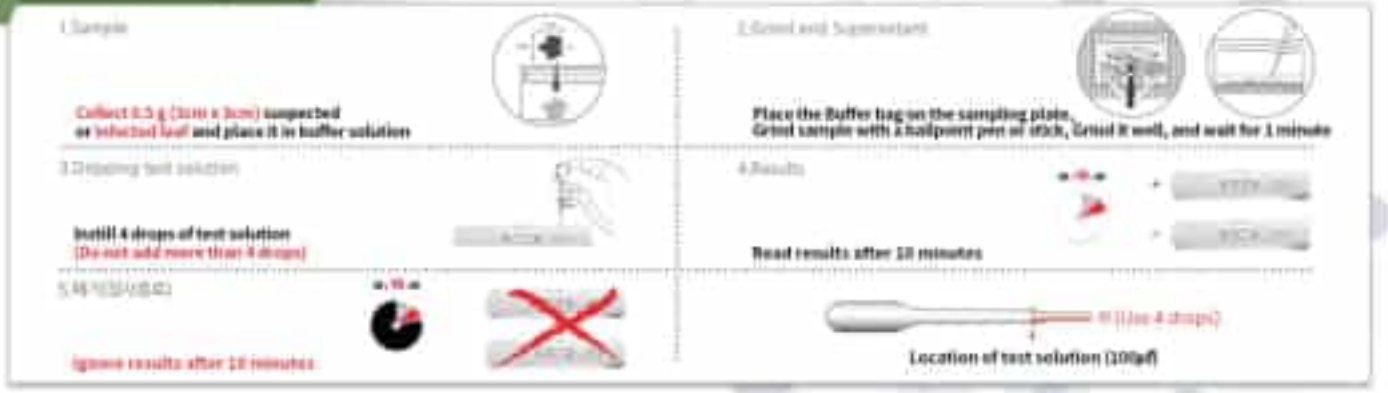
3 Target disease symptoms

- Symptoms of leaf light color and mosaic appear.
- It is not a major problem when infected alone, but when combined with other viruses such as CMV, leaf color light and mosaic symptoms become severe

Leaf mosaic and color light weak
(BBWV2 and CMV complex infection)

Color light weak
(BBWV2 and PepMov complex infection)

4 How to use



5 Control method

- It is important to eliminate infected crop through rapid diagnosis at the first symptom
- Before transplanting, test them with a diagnostic kit before planting them
- Install netting when seedlings to prevent aphids from flying in
- Aphids are captured by installing yellow sticky traps
- Minimize diseases caused by aphids thoroughly controlling aphids well

Tobacco Mosaic virus (TMV)

Prevent damage and spread through early virus diagnosis

1 Technology outline

Target disease	*Tobacco mosaic virus*
Sample target	Infected part, Suspicious part
Infection	Seed-borne and easily transmitted through tools and human handling
Target crop	Fruits and vegetables, Floricultural crops
Inspection	Non-vector transmissible; Mechanically transmissible through sap

2 Need for Diagnosis

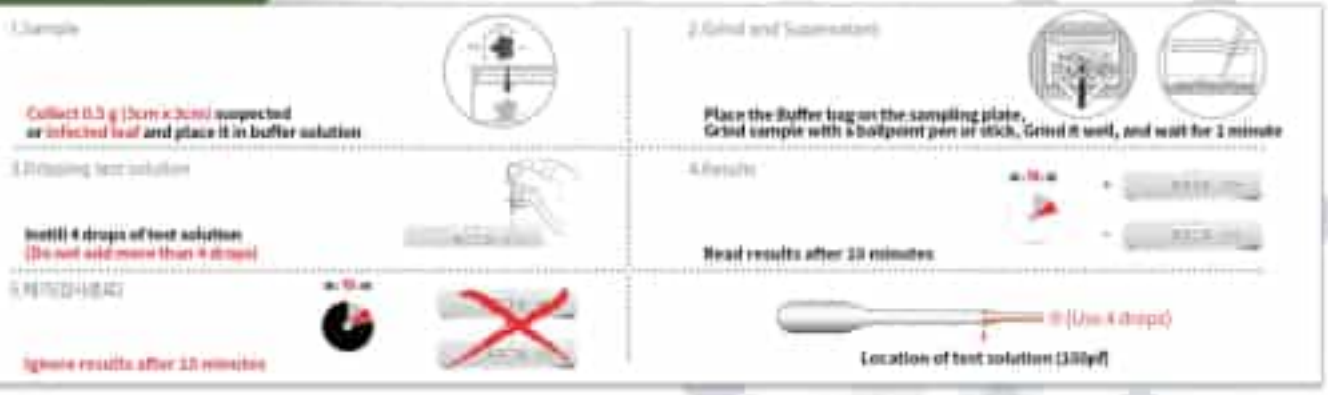
- Is there a disease or not?, Check soil heathy or not, Quick and appropriate prescription through early detection of disease

3 Target disease symptoms

- Plant growth is inhibited and fruits become smaller.
- Symptoms vary depending on the cultivation environment, including yellow mosaic on leaves, fruit deformation, and fern-like leaf shape.
- Infection at an early growth stage causes severe damage, whereas infections occurring later in the growing season tend to result in less damage.
- Symptoms such as mottling, discoloration, leaf curling, twisting, and stunting appear on the leaves, flowers, and the entire plant.



4 How to use



5 Control method

- Infected plants should be identified through early diagnosis and removed immediately.
- This virus has a highly stable structure and can overwinter in infected plant residues in the soil, surviving for several years.
- Strict hygiene management and the use of resistant cultivars are the most effective control methods.
- Hygiene practices include removing infected plants, washing hands thoroughly with soap, and disinfecting farming tools and materials.
- Seeds should be properly disinfected before sowing.

Prevent damage and spread through early virus diagnosis

1 Technology outline

Target disease	*Turnip Mosaic Virus (TuMV)*
Sample target	Infected part, Suspicious part
Specificity	95% over, Sensitivity 95%
Infection	Vector-borne transmission by Aphids(Non-persistent manner)
Target crops	Cruciferous and other leafy crops including Radish, Chinese Cabbage, Cabbage, Turnip, Crown Daisy, and Spinach

2 Need for Diagnosis

- Is there a disease or not?, Check soil heathy or not, Quick and appropriate prescription through early detection of disease

3 Target disease symptoms

- **Mosaic Symptoms**: Formation of irregular, mottled patterns of alternating yellow and green patches on the leaves.
- **Vein Clearing**: Early-stage infection often exhibits vein clearing, where the tissue along the veins becomes translucent.
- **Growth Retardation & Deformity**: Infected plants suffer from stunted growth, with leaves becoming wrinkled or malformed. In severe cases, systemic infection leads to necrosis and plant death.

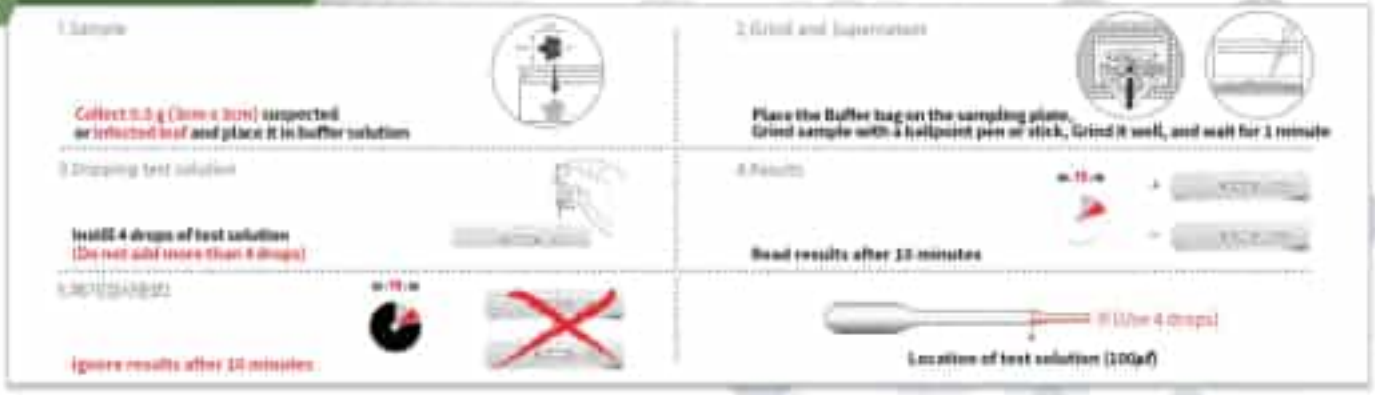
Yellowing and Chlorosis in Kimchi cabbage

Chlorotic Yellowing in Cabbage

Distinct Mosaic and Mottling on Radish Leaves

Severe Mosaic Malformation in Turnip

4 How to use



5 Control method

- **Intensive Aphid Control**:Ensure rigorous aphid management starting from the seedling stage to prevent early inoculation.
- **Early Eradication**:Conduct regular field inspections to identify and remove suspected infected plants immediately.
- **Diagnostic Verification**:Confirm the specific viral pathogen through early diagnostic testing and focus on suppressing the primary and secondary aphid vectors.

Prevent damage and spread through early virus diagnosis

1 Technology outline

Target disease	*Potato Virus Y (PVY)*
Sample target	Infected part, Suspicious part
Specificity	95% over, Sensitivity 95%
Infection	Vector-borne transmission by Aphids(Non-persistent) and via infected seed potatoes
Target crops	Solanaceous crops including Potato, Tobacco, Pepper, and Tomato

2 Need for Diagnosis

- Is there a disease or not?, Check soil heathy or not, Quick and appropriate prescription through early detection of disease

3 Target disease symptoms

- Foliage:Leaves exhibit yellowing and the development of pale green mosaic patterns.
- Necrosis & Rugosity:Leaves become wrinkled (rugose), with progressive vein necrosis appearing along the leaf veins.
- Field Pattern:Often observed in clustered outbreaks within specific areas of the field.
- Tuber Quality:Internal browning or necrosis of the potato tubers (Potato Tuber Necrotic Ringspot Disease, PTNRD), significantly reducing quality.

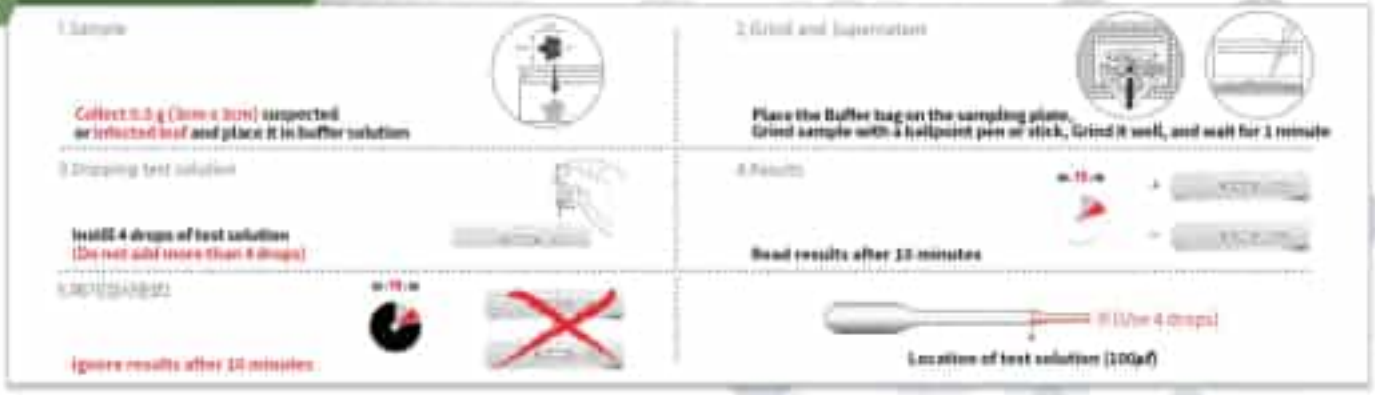
Progressive chlorosis of potato foliage

Dark brown necrotic streaks along the veins of potato leaves

Small, dark brown necrotic spots on tomato leaves or stems

Systemic necrosis accompanied by upward or downward leaf curling

4 How to use



5 Control method

- Vector Suppression:Implement rigorous aphid control at the earliest stages of growth to prevent virus introduction.
- Seed Potato Integrity:Ensure the use of certified virus-free seed potatoes and maintain strict disinfection protocols.
- Early Diagnosis & Eradication:Utilize rapid diagnostic kits to identify the infection source early and concentrate efforts on initial vector (aphid) management to prevent secondary spread.

Scheduled for release in 2026

Prevent damage and spread through early virus diagnosis

1 Technology outline

Target disease	*Tomato Yellow Leaf Curl Virus (TYLCV)*
Sample target	Infected part, Suspicious part
Specificity	95% over, Sensitivity 95%
Infection	Silver leaf Whitefly (Bemisia tabaci)
Target crops	Solanaceous crops including Tomato, Pepper, and Eggplant

2 Need for Diagnosis

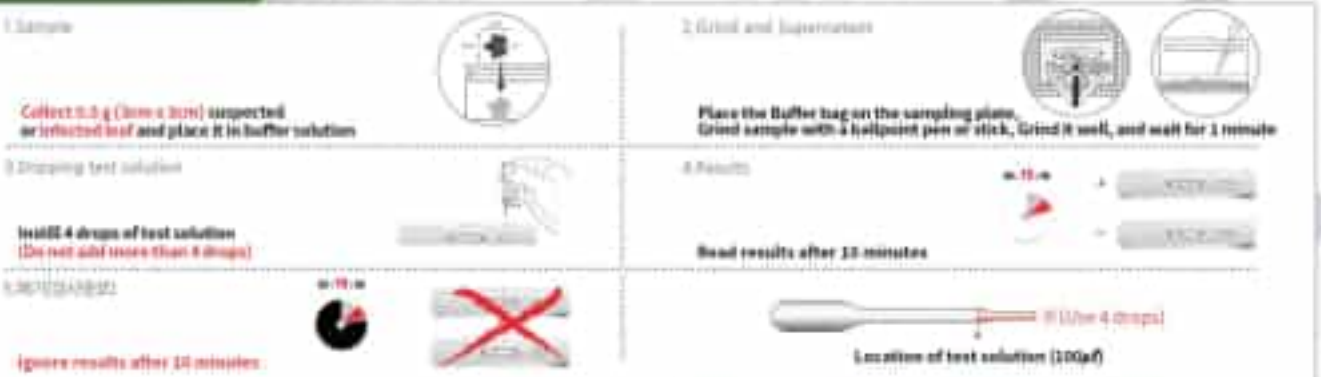
- Is there a disease or not?, Check soil heathy or not, Quick and appropriate prescription through early detection of disease

3 Target disease symptoms

- Foliage:Upward curling of leaf margins (leaf curl).
- Coloration:Progression from pale green to distinct yellowing (chlorosis).
- Growth:Severe stunting and malformation of leaves; thickening of leaf tissue leading to the cessation of terminal growth.
- Fruit:Production of small, poorly colored, and deformed fruits, significantly reducing marketable yield.

Source: Rural Development Administration (RDA) Farming Technology (Nongsaro)

4 How to use



5 Control method

- Vector Control:TYLCV is primarily transmitted and spread by whiteflies in Solanaceous crops. Intensive management of whitefly populationsis critical.
- Physical Barriers & Sanitation:Rigorous monitoring for seedling infection, installation of fine insect-proof netting, and immediate removal of infected "rogue" plants.
- Rapid Diagnosis:Early detection using Rapid Diagnostic Kits to confirm viral presence at the first sign of abnormal symptoms.
- Nursery Management:Strict hygiene protocols during the seedling stage to prevent early-onset outbreaks.
- Early Intervention:Due to the whitefly's short life cycle and high reproduction rate, pest control efforts must be concentrated at the initial stage of occurrence to prevent exponential spread.

PMMoV

Scheduled for release in 2026

Prevent damage and spread through early virus diagnosis

1 Technology outline

Target disease	*Pepper Mild Mottle Virus (PMMoV)*
Sample target	Infected part, Suspicious part
Specificity	95% over, Sensitivity 95%
Infection	Silver leaf Whitefly (Bemisia tabaci)
Target crops	Chili pepper, Bell pepper, and Paprika

2 Need for Diagnosis

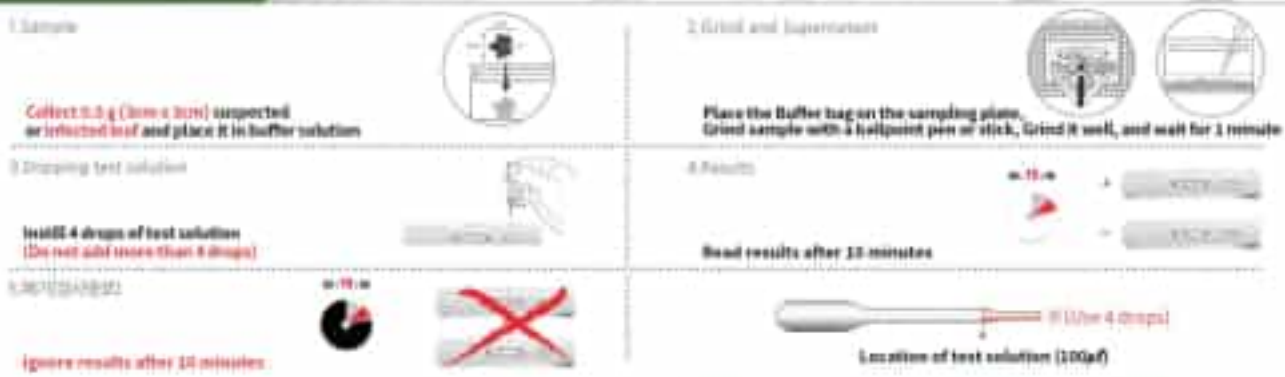
- Is there a disease or not?, Check soil heathy or not, Quick and appropriate prescription through early detection of disease

3 Target disease symptoms

- **Foliage:** Distinct light green mosaic patterns, primarily emerging on new shoots.
- **Leaf Morphology:** Leaves become narrow, stunted, and exhibit marginal curling.
- **Fruit Quality:** Fruits are significantly undersized with rough surfaces and necrotic spotting, leading to loss of market value.
- **Growth Habit:** Reduced development of lateral branches and overall poor vegetative growth.

Source: Rural Development Administration (RDA) Farming Technology (Nongsaro)

4 How to use



5 Control method

- **Seed Health:** Use only certified virus-free seeds. Seed disinfection (e.g., Trisodium Phosphate treatment) is highly recommended.
- **Field Sanitation:** Thoroughly remove crop residues from previous seasons to eliminate soil-borne primary inoculum.
- **Mechanical Prevention:** As PMMoV is highly infectious through contact, disinfect tools and hands frequently during pruning and harvesting.

Scheduled for release in 2026

Prevent damage and spread through early virus diagnosis

1 Technology outline

Target disease	*Pepper Mottle Virus (PepMoV)*
Sample target	Infected part, Suspicious part
Specificity	95% over, Sensitivity 95%
Infection	Vector-borne transmission by Aphids
Target crops	Solanaceous crops including Chili Pepper, Paprika, Bell Pepper, and Tomato

2 Need for Diagnosis

- Is there a disease or not?, Check soil heathy or not, Quick and appropriate prescription through early detection of disease

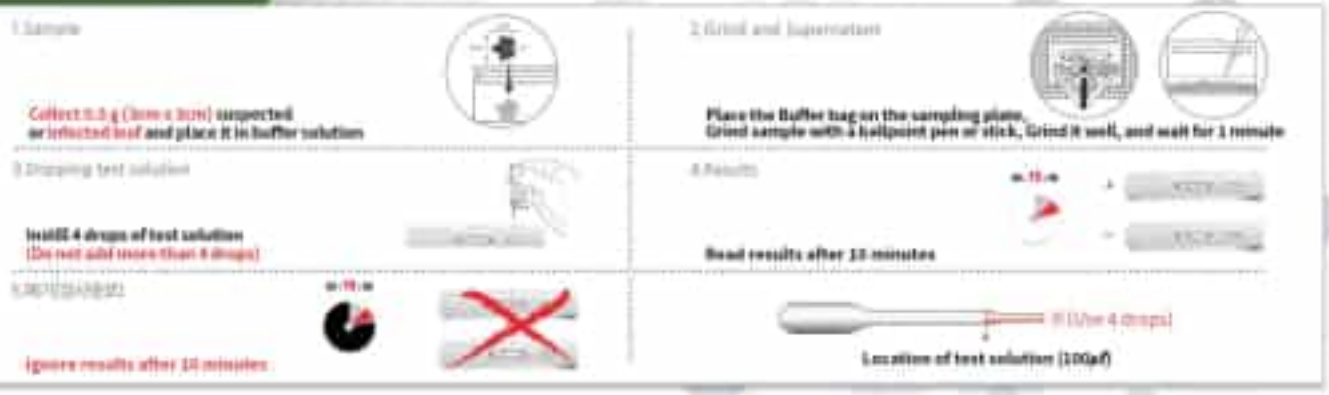
3 Target disease symptoms

- **Foliage:** Young leaf veins become translucent (vein clearing), progressing to a mosaic patterninterspersed with yellow spots across the entire leaf.
- **Fruit:** Fruits exhibit reduced size and characteristic mottling(irregular spotted patterns) on the surface, significantly lowering quality.
- **Vectors:** Primarily transmitted by aphid species such as the Green Peach Aphid(Myzus persicae) and the Cotton Aphid(Aphis gossypii).




Source: Rural Development Administration (RDA) Farming Technology (Nongsaro)

4 How to use



5 Control method

- **Intensive Aphid Control:** Implement rigorous aphid managementprotocols starting from the nursery/seedling stage to prevent early inoculation.
- **Resistant Cultivars:** Utilize resistant varietiesand immediately identify and remove suspected infected plantsto eliminate the source of infection.
- **Early Diagnosis & Vector Suppression:** Confirm the causal pathogen through early diagnostic testing and focus on suppressing the specific vector (aphids) to prevent secondary spread within the field.

CABYV

Scheduled for release in 2026

Prevent damage and spread through early virus diagnosis

1 Technology outline

Target disease	*Cucurbit Aphid-Borne Yellows Virus (CABYV)*
Sample target	Infected part, Suspicious part
Specificity	95% over, Sensitivity 95%
Infection	Vector-borne transmission by Aphids(Persistent manner)
Target crops	Cucurbitaceous crops including Watermelon, Melon, Pumpkin, and Cucumber

2 Need for Diagnosis

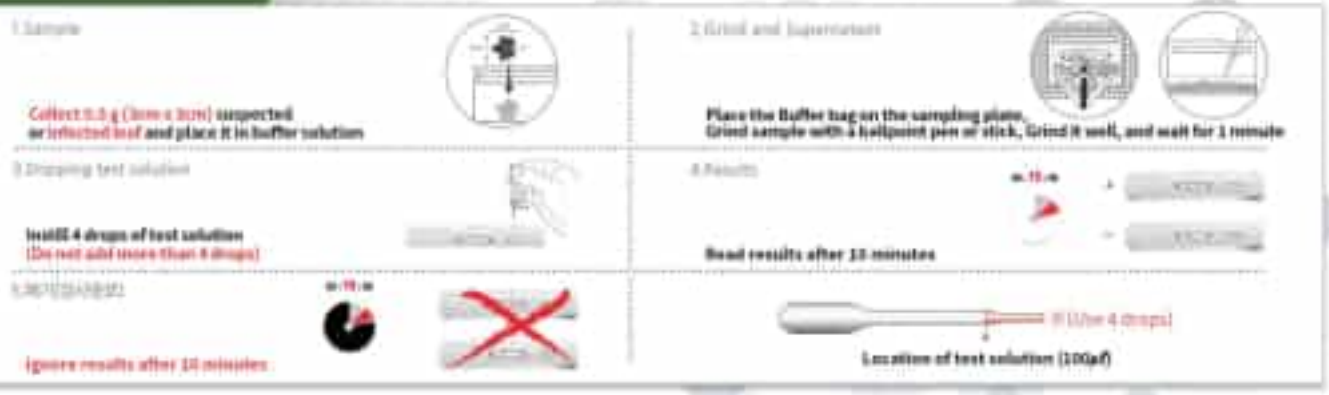
- Is there a disease or not?, Check soil heathy or not, Quick and appropriate prescription through early detection of disease

3 Target disease symptoms

- **Leaf Yellowing (Chlorosis):** Symptoms initiate with yellowing of the leaf margins, eventually progressing to cover the entire leaf surface while the veins remain green(Interveinal chlorosis).
- **Chlorotic Spots & Mosaic:** Occurrence of chlorotic spots or irregular mosaic patterns on the foliage. Growth Retardation: Significant decline in overall plant vigor due to reduced photosynthetic capacity.
- **Fruit Malformation:** Poor fruit set and distorted fruit shapes; in melons, it causes irregular net formationand severe loss of marketability.

Source: Rural Development Administration (RDA) Farming Technology (Nongsaro)

4 How to use



5 Control method

- **Vector Control:** Intensive aphid managementfrom the seedling stage is crucial to prevent the primary introduction of the virus.
- **Cultivation Practices:** Utilize resistant varieties whenever available and immediately rogue (remove and destroy) any suspected infected plants to limit further spread.
- **Diagnostic Verification:** Differentiate from nutritional deficiencies through early diagnostic testing and implement targeted vector suppression.
- **Sanitation:** Eliminate nearby weeds and volunteer cucurbit plants that act as alternative hosts to break the infection cycle and block the primary inoculum source.

Scheduled for release in 2026

Prevent damage and spread through early virus diagnosis

1 Technology outline

Target disease	*Watermelon Mosaic Virus (WMV)*
Sample target	Infected part, Suspicious part
Specificity	95% over, Sensitivity 95%
Infection	Vector-borne transmission by Aphids(Non-persistent manner)
Target crops	Wide range of Cucurbitaceous crops including Watermelon, Melon, Pumpkin, Squash, and Cucumber

2 Need for Diagnosis

- Is there a disease or not?, Check soil heathy or not, Quick and appropriate prescription through early detection of disease

3 Target disease symptoms

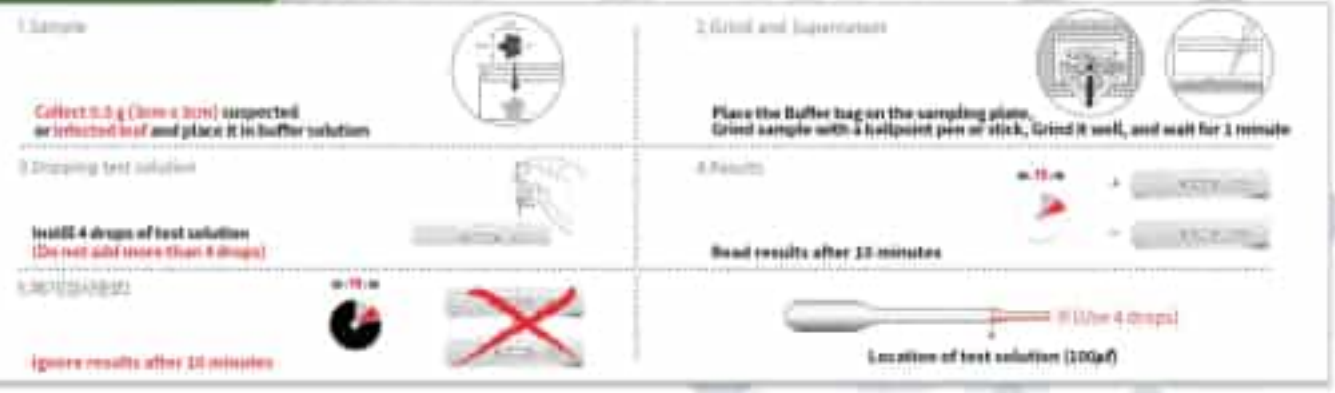
- **Mosaic & Mottling:** Emergence of distinct mosaic patterns and irregular green mottling on the foliage.
- **Leaf Malformation:** Leaves may become distorted, narrowed (filiform), or exhibit blisters on the surface.
- **Growth Retardation:** Stunt plant growth and diminish overall vigor

Source: Rural Development Administration (RDA) Farming Technology (Nongsaro)

watermelon

pumpkin

4 How to use



5 Control method

- **Systemic Aphid Control:** Implement rigorous aphid management protocols starting from the nursery/seedling stage to prevent early-season primary infection.
- **Resistant Cultivars & Eradication:** Prioritize the cultivation of resistant varieties and perform regular field scouting to immediately remove and destroy suspected infected plants to eliminate the source of secondary spread.
- **Early Diagnosis & Vector Suppression:** Confirm the specific causal pathogen through rapid diagnostic testing at the first sign of symptoms, followed by targeted suppression of the aphid vectors to contain the outbreak.

CymMV

Scheduled for release in 2026

Prevent damage and spread through early virus diagnosis

1 Technology outline

Target disease	*Cymbidium Mosaic Virus (CymMV)*
Sample target	Infected part, Suspicious part
Specificity	95% over, Sensitivity 95%
Infection	Mechanical transmission via contaminated tools and propagation from infected mother plants
Target crops	Various orchid species, including Cymbidium and Phalaenopsis

2 Need for Diagnosis

- Is there a disease or not?, Check soil heathy or not, Quick and appropriate prescription through early detection of disease

3 Target disease symptoms

- **Mosaic & Chlorosis:** Appearance of pale green or yellowish mottled patterns (mosaic) on the leaves.
- **Necrotic Spotting & Streaking:** As the infection progresses, necrotic (dead tissue) lesions develop, forming sunken spots or elongated streaks.
- **Floral Symptoms:** Brown or black necrotic symptoms appear on the petals, followed by premature wilting of the flowers.
- **Mixed Infection:** Frequently occurs as a co-infection with Odontoglossum ringspot virus (ORSV), exacerbating the severity of symptoms.

Source: Rural Development Administration (RDA) Farming Technology (Vanguard)

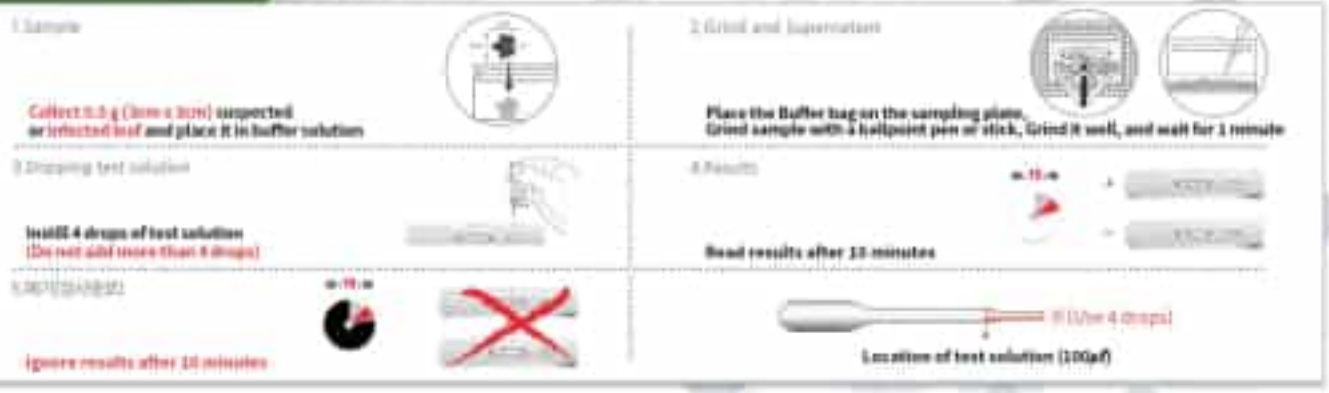
Mosaic Spotting in Orchids

Phalaenopsis Mosaic Symptoms

Cymbidium Leaf Chlorosis

Floral Color Breaking and Discoloration

4 How to use



5 Control method

- **Stringent Tool Disinfection:** Sterilize all cutting and handling tools by immersion in 70% Ethanol or 10% Sodium Hypochlorite (bleach) solution.
- **Isolation & Eradication:** Immediately isolate or rogue (discard) any individual plants suspected of infection to prevent facility-wide spread.
- **Early Screening:** Conduct rigorous early diagnostic testing on vegetative propagation stock and tissue-cultured plantlets to ensure virus-free status.