Strawberry Production In The Philippines

Increasing Production Through The Control of Fungi, Bacteria and Nematodes

Philippine Production

In the Philippines, strawberry is grown only in Benguet Province because of its geographic location and climate. It has been a lucrative source of income for Benguet farmers and enhances the revenue of Benguet Province.

Major Obstacle to Production

Diseases are a major factor limiting both fruit and plant production. They are difficult to control without accurate disease diagnosis and appropriate pesticide.

Disease Incidences in Camarines Norte

There were five disease incidences observed in growing strawberries in Labo, Camarines Norte.

Commonly observed were:

- Anthracnose flower blight
- Anthracnose leaf spot
- Alternaria fruit rot
- Gray mold (Gray mold disease caused by *Botrytis cinerea* has the highest disease incidence.)
- Sclerotium rot

Prevalent Diseases

Fungi, bacteria and nematodes limit growth and production

- Verticillium wilt
- Red stele
- Leaf scorch
- Leaf spot
- Leaf blight
- Gray mold

Trial Methodology

Three concentrations of Path-Away® (PA) solution were tested

T1- Control (distilled water)
T2- 3% Path-Away
T3- 4% Path-Away
T4- 5% Path Away
T5- Fungicide (as recommended)

Trial Methodology

- Twenty (20) strawberry plants were planted for each treatment with three replicates in a raised bed. A ratio of 1:2 carbonized rice hull and vermicast was used as planting medium.
- Raised beds were treated 5 days before transplanting and once a month there after.
- Fermented Plant Juice (FPJ) and Fermented Fruit Juice (FFJ) were applied regularly as soil amendment.

Trial Methodology

- Watering, weeding and removal of old leaves were performed regularly to maintain the plants. Occurrence of diseases were observed on each treatment and were documented and recorded.
- Plant parts of suspected diseased plant were collected and brought to the laboratory for isolation of pathogens.

Trial Methodology

- Pure cultures were examined under the microscope for identification.
- Diseases on each treatment were compared to evaluate the effect of the different concentration of the anti-pathogenic solution in controlling incidence of strawberry diseases.

Disease	TREATMENTS				
	D H2O	3% PA	4% PA	5% PA	Fungicide
Anthracnose Flower blight	+	+			
Anthracnose leaf spot	+				
Alternaria fruit rot	+	+			
Gray mold	+	+	+		+
Sclerotiun rot	+	+	+		+

Strawberry diseases observed at different treatments

Disease	TREATMENTS				
	D H2O	3% PA	4% PA	5% PA	Fungicide
Anthracnose Flower blight	3	1	0	0	0
Anthracnose leaf spot	5	0	0	0	0
Alternaria fruit rot	10	7	0	0	0
Gray mold	35	15	5	0	7
Sclerotiun rot	25	11	3	0	4

Percentage of disease incidence at different treatments

Verticillium Wilt

Verticillium wilt can be a major factor limiting production. When a plant is severely infected by the Verticillium wilt fungus, the probability of it surviving to produce a crop is greatly reduced. The fungus can survive in soil, and, once it becomes established in a field or garden, it may remain alive for 25 years or longer.

Verticillium Wilt

Cool, overcast weather with periods of warm bright days produces ideal conditions for growth and disease development. Infection and disease development will occur with soil temperatures of 70 to 75 degrees F (21 to 24 degrees C).

Verticillium Wilt

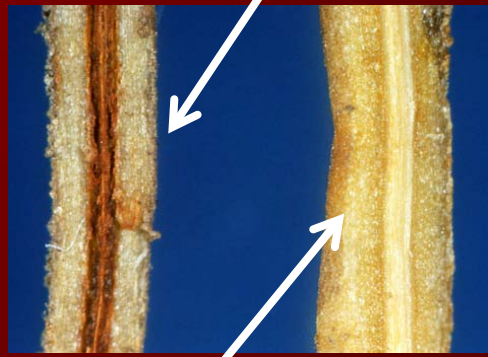
It can be introduced to the crop by:

- Infected seed
- Farm implements
- Farm machinery
- Soil from transplants
- Roots from transplants

Red Stele Root Rot

This root rot disease has become a serious problem facing strawberry production. The disease is most destructive in heavy clay soils that are saturated with water during cool weather when the fungus is most active. The red stele fungus can survive in soil for up to 13 years or longer once it becomes established in the field or garden.

Diseased Root



Healthy Root

Leaf Scorch

Leaf Scorch is a common leaf disease in matted row systems. The pathogen can survive and cause disease at a wide range of temperatures, and has been reported to cause disease year-round on perennial crops. Planting frequently is recommended in these systems since the disease usually is not severe the first or second year after planting.

Leaf Spot

Leaf Spot

The most noticeable symptoms of the disease are small, round, necrotic (i.e., dead) spots on the leaves. These spots develop on the upper leaf surface and are deep purple to red in color. The spots eventually develop tan, gray or almost white centers with distinct reddish-purple to brown borders.

Leaf Blight

The disease is considered a “summer” disease affecting warm climates. The pathogen infects leaves, but may also affect the runners and daughter plants decreasing nursery plant yields.

Reddish purple spots $^{3}/_{8}$” to $^{1}/_{2}$” in diameter develop on leaflets and eventually enlarge to become V-shaped and delineated by major leaf veins causing severe defoliation .

Gray Mold

Gray mold of strawberries is caused by a fungus, *Botrytis cinerea.* It infects both flowers and fruits. Botrytis can greatly reduce fruit yields and is considered one of the most damaging diseases of strawberry. Botrytis is most prevalent during prolonged cool, wet weather during bloom and near harvest.

Results

Based on Table 1, at 3% PA solution (T2) the incidence of Anthracnose flower blight was reduced to 1% and anthracnose leaf spot was eliminated. At 4% PA, Alternaria fruit rot incidence was controlled while gray mold disease and Sclerotium rot incidence were significantly reduced to 10% and 3% respectively.

However, while treatment of 5% PA totally controlled all the five diseases, the use of the Fungicide (Manzate 200) only reduced gray mold and Sclerotium rot to 7% and 4%.

Path-Away®

The Path-Away anti-pathogenic solution is a certified organic broad spectrum anti-pathogenic solution with no GMO. It is derived from natural resources with no added chemicals, drugs or alcohol and synthesized from all naturally occurring substances. Basing from the product's Material Safety Data Sheet, the solution is environmentally safe with extremely low toxicity to humans, plants, animals and the environment. It is considered as broadest spectrum action against diseases that attacks animals and plants.

Conclusions

- At 5% PA, Gray mold, the most persistent disease of strawberry was totally controlled in contrast to the fungicide used (Manzate 200) that reduced incidence from 35% to 7%.

- Similarly, Sclerotium rot was also totally controlled at treatment with 5% PA and was reduced from 25% incidence to 4% incidence using the same fungicide.

Conclusions

This study revealed that at 5% concentration of the Path-away anti pathogenic solution, one of the most problematic pathogens of strawberry like *Botrytis sp* and *Sclerotium* sp. with no known specific control can be managed.

<u>This solution in this study conforms with our advocate for organic production.</u>

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