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In This Issue:

Identification and management of an emerging strawberry disease: Neopestalotiopsis leaf, fruit and crown rot

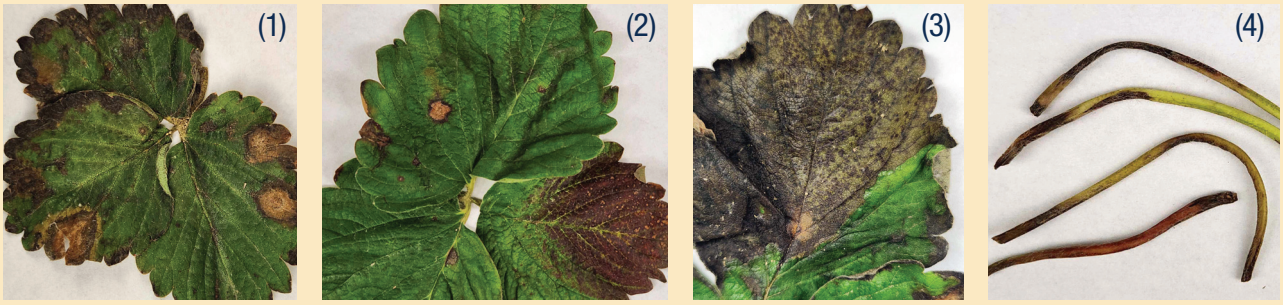
Neopestalotiopsis leaf, fruit and crown rot is an important emerging fungal disease of strawberry that can affect every part of the plant (crown, runner, leaf, fruit). The symptoms were first observed in 2018, following an outbreak in Florida in annual plasticulture fields. The pathogen is most frequently introduced via infected planting stock. Pestalotia-like organisms used to be considered weakly pathogenic and secondary on many hosts, especially on stressed plants. However, the emergence of a more aggressive strain of Neopestalotiopsis on strawberry has resulted in significant crop losses throughout the southeastern U.S. in recent years.

Source of infection in fruiting fields

Infected plants from nurseries or plug production facilities are the primary source for fruiting fields. Plants from one nursery in North Carolina were the major source of contaminated plug plants in 2018, and gradually spread to other nurseries. However, in 2024, plants from Canadian nurseries also were reported to have Neopestalotiopsis infections. Plant suppliers in the Mid-Atlantic region reported contaminated cuttings and, thus, plug plants. If you have planted strawberry this fall, you need to make a closer observation of the symptoms mentioned below.

Leaf symptoms

Leaf spots are often the earliest visible symptom of Neopestalotiopsis in newly planted strawberry fields and can occur in the fall as plants are getting established. Leaf symptoms can resemble those caused by pathogens, such as Gnomonia leaf spot and Phomopsis leaf spot, or secondary organisms, like Alternaria. Small leaf spots with a light center and slightly darker border become visible when plants are established. These spots can quickly expand



Figures 1-4. Symptoms of Neopestalotiopsis disease on strawberry; 1-2 (leaf symptoms); 3 (spore mass on infected leaf area; 4) lesions on petiole. (Photo credit: MM Rahman)

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Identification and management – *continued from page 1*

and become irregular in shape (Figure 1). Large areas with brown tints also can be visible in some cases (Figure 2). Under high humidity, dark black structures (spore mass/ acervuli) of the fungus can be seen on the upper leaf surface (Figure 3). To create a favorable condition for these structures to grow, you may place symptomatic leaves sampled from the field in a sealed bag with a damp paper towel, leave at room temperature for a few days and observe under the magnifying lens. Black necrotic areas also can be found on petioles and runners (Figure 4).

Crown infection also is common when spores from leaves are washed down. If crown is infected whole plant can get stunted an eventually die. If not adequately managed, fruit will be infected in the spring. Fruit infection can occur in the spring that starts as small brown lesion and soon can expand to sunken, tan area with abundant black sporulation (Figure 5 A,B,C). Early symptoms may resemble other fruit rots (Gnomonia, leather rot, Botrytis, anthracnose), but can be distinguished by the distinctive black spore masses (acervuli) on lesions.

Management

The best option is to avoid infected plants. Since the spores disperse in rain and cause new infections, it is important that no field work is done when plants are wet. Most plant supply systems this year had some level of infections. So, growers are advised to scout their plants for any symptoms mentioned above, especially leaf symptoms, and proactively start application of fungicide products mentioned below.

Suggested Spray Program (Fall)

When applied as directed to control labeled diseases, these fungicides have shown efficacy against *Neopestalotiopsis* and can be used in rotation as shown below.

Apply immediately after planting and continue as new leaves emerge on a seven-to-14-day schedule. Use longer intervals between sprays under dry conditions and shorter intervals in wet conditions when disease pressure is high. Good coverage is critical; use adequate pressure (>80 PSI) and 80 to 100 gallons of spray solution per acre.

Spray #1 – Thiram SC[z] at 2 to 2.5 quarts per acre

Spray #2 – Tilt, Rhyme or Inspire at labeled rates

Spray #3 – Thiram SC[z] at 2 to 2.5 quarts per acre

Spray #4 – Tilt, Rhyme or Inspire at labeled rates

Spray #5 – Thiram SC[z] at 2 to 2.5 quarts per acre

Repeat as necessary, within label limitations -- see comments below.

The fungicide **Switch** (cyprodinil + fludioxonil) also is an option; however, Switch is more useful in spring for protection of leaves, flowers and fruit, and in most cases, should be reserved for spring use.

Tilt, Rhyme and **Inspire** are all FRAC 3 fungicides and are collectively limited to four applications per year.

Tilt (propiconazole) has a mild grow regulator effect (greening, shortened runners and petioles) when used continuously on strawberry. Rotate products and do not use Tilt for more than three applications.

[z]**Thiram SC** is a broad-spectrum, protectant fungicide that protects strawberries from disease development with multiple site activity.

[y]**Thiram** is limited to 12 applications per year east of the Mississippi River, five applications west.

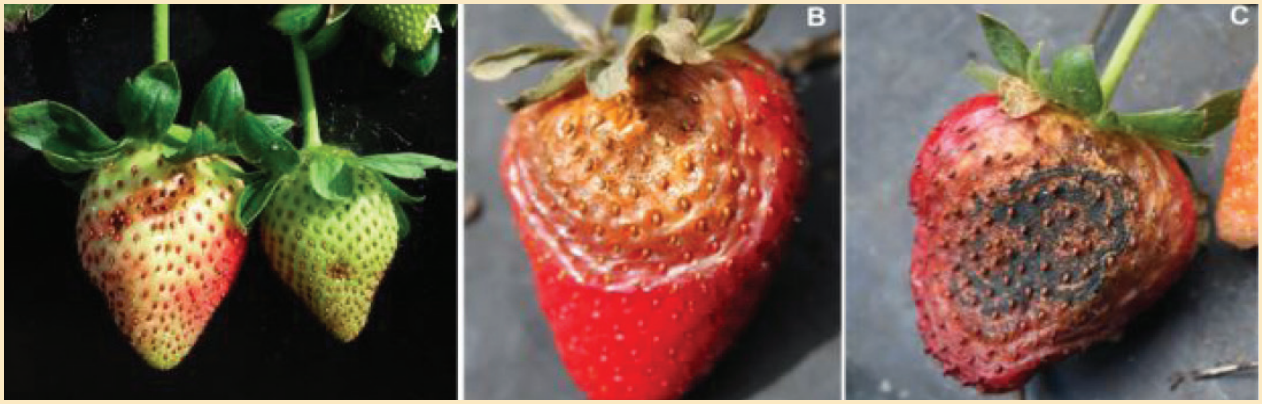

Figure 5A-C. Fruit lesion. (Photo credit: University of Florida)

Dodder – A parasitic noxious weed

Dodders are parasitic weeds seen in certain pockets of West Virginia that can colonize wetlands, crops, shrubs and trees (Figure 6). They grow in temperate regions and belong to the genus Cuscuta in the morning glory family (Convuluceae). Dodders are characterized by distinct yellow or orange thread-like stems devoid of leaves that can entangle stems and leaves of its host plant (Figures 7, 8). They lack chlorophyll, the green pigment in plants, which facilitates photosynthesis. Being a parasitic plant, it depends on host plants for growth, drawing nutrients and water through tiny modified adventitious roots referred to has haustoria that are inserted into the conducting vessels of the host plant.

Dodder is an annual weed that germinates in spring as the soil temperature reaches about 60 F. Once the seedling germinates, it must attach itself to the host plant within five days in order to continue growing. A dodder seedling finds a suitable host by sensing volatiles emitted by preferred host plants – it was observed that between a wheat plant and tomato plant, the seedling grows preferentially toward the tomato plant. Once it attaches to the host, the root dries out to allow the young dodder to be airborne or to be attached to the host plant until it is killed by a frost.

Dodder plant blooms between late spring and early fall to produce tiny flowers with four to five white or light pink petals to generate thousands of seeds per plant. The thread-like stems can form tangled mats on the host plants. Once they cover the host plants, the latter may cease to grow or be killed depending upon the extent of infestation. Typical hosts include crops, such as tomato, potato, alfalfa, carrots and onions, and ornamentals, such as chrysanthemum, dahlia and English ivy.

Once dodders establish in an area, it can be difficult to eradicate them. Early detection and removal are the best approaches to prevent them from gaining foothold. Seeds can thrive the soil for up to 30 years; only about 5% of viable seeds may germinate each year. Practices like crop rotation, adequate row spacing, delayed planting, light cultivation before planting and cultivation after planting the crop can be effective.

Dodder typically does not respond to herbicide when applied after emergence unless systemic herbicide is applied to kill the entire host plant on which they grow. Mechanical removal of top growth is usually not successful since they can grow back from haustoria attached to the host plant. The herbicide Casoron (dichlobenil) is effective if applied in late fall or early spring as a pre-emergence treatment.

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Figure 6. Dodder (Cuscuta spp.) colonizing a wetland ecosystem in Mason County, WV. (Photo credit: W. Dudding)

Figure 7. Dodder (Cuscuta spp.) taking over a flower bed in Barber County. (Photo credit: J. Carpenter)

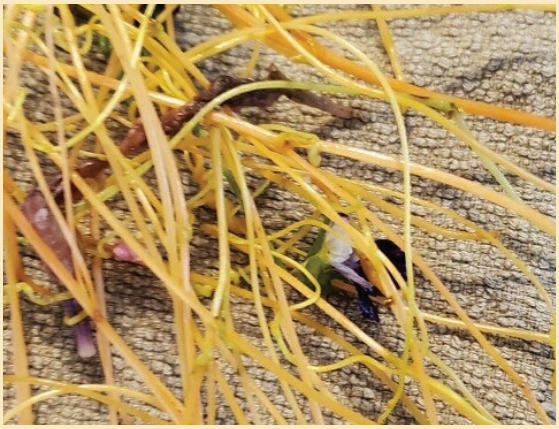

Figure 8. A dodder (Cuscuta spp.) vine characterized by yellow to orange colored thread-like stems devoid of leaves. (Photo credit: J. Carpenter)

Dodder – *continued from page 3*

Please refer to the label to see listed crops to which this herbicide can be applied safely.

Dodders are listed in the Federal Noxious Weed List, which means that they have to be actively managed where they are present and cannot be spread or transported intentionally

Soils – This is where everything begins!

While watching the recent wildfires evolve in California, one cannot help but think about the long-lasting consequences. Burned homes, burned landscapes, scorched land and unhealthy soils at the end of it all. They will be faced with high soil pollution, and it will take an exceptionally long time to bring it back to a healthy range again. That brings up a question: what is a healthy soil?

Both farmers and home gardeners will agree that a good, healthy soil is the one that is easy to work, crumbly, has plenty of organic matter to make it dark in color, has good water retention capacity that can show resilience when unfavorable conditions occur, suitable for supporting plant growth, has high yields of good quality products annually, has plenty of microbes and beneficial organisms like earthworms, reduces need for fertilizer applications, and even has reduced pest problems.

If we are facing issues like soil compaction due to heavy traffic (pedestrian or machinery), that will affect the plant growth through restricted root growth, poor water infiltration resulting in water pooling or ponding, increased sensitivity to water runoff and erosion, poor water retention leading to poor nutrient availability and retention, and reduced air availability in the soil. These are not characteristics of a good soil. Contributing factors to poor soil characterization are high pathogen pressure due to low microbial activity and high weed pressure.

By minimizing or eliminating all these issues identified as contributing factors to soil decline, we are maintaining soil in good condition and good health. One of the first researchers that recognized the issues with the "sick soils" was Liberty Hyde Bailey, a botanist and horticulturist who recommended introducing new plants, or crop rotation, as a "cleaning process for sick soils" back in 1907.

Benefits of crop rotation management practices are improvement of soil physical properties, such as structure (soil loosening, aeration, water-holding capacity, drainage), biodiversity and increased organic matter, and the living roots cause new aggregates to form.

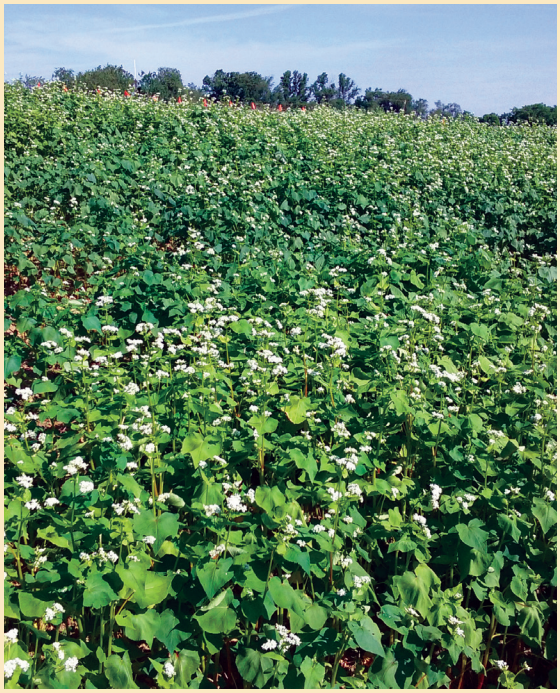

Figure 9. Buckwheat as a cover crop. (Photo credit: M. Danilovich)

Figure 10. Oilseed radish to break soil compaction. (Photo credit: M. Danilovich)

Dormant applications for arthropod management

Chemical control is the use of insecticides to control outbreaks of arthropod pests. For integrated pest management programs, it is used in combination with cultural, mechanical and biological approaches. When insecticides are applied targeting pests during the growing season, they also can affect other organisms active in the plants. However, some arthropod pests, such as aphids, adelgids, psyllids, scale insects and spider mites, can be managed during the dormant season to reduce the impact of insecticides on beneficial insects, such as pollinators. Dormant applications are applied after leaves drop in the fall and before buds swell in spring.

Types of oils

Oils are used for dormant applications. Oils are insecticides that can be categorized into two groups: petroleum-based oils and non-petroleum-based oils. The refined petroleum insecticides can be applied during dormant season and are preferred for professional applicators. Horticultural oils, also known as summer oils, can be applied during both dormant and growing seasons. In contrast, dormant oils are only used during dormant season.

Non-petroleum-based oils are used during the growing season. They are mostly produced from plant extracts, such as sesame seed, neem seed, rosemary, soybean and combinations.

Characteristics of oils

Unsulfonated residue, density and viscosity are factors that distinguish horticultural oils from dormant oils. They also determine the effects of the oils on plants. For example, dormant oils have 50% to 90% unsulfonated residues (50% to 10% unsaturated hydrocarbons), and they can damage green plants and tender stems. Horticultural oils have 92% to 96% unsulfonated residues (8% to 4% unsaturated hydrocarbons), and they are much safer to use on leaves and stems. Unsaturated hydrocarbons are more unstable than saturated hydrocarbons, and when they are sprayed onto plants, they form substances which are toxic to plants.

Dormant oils have a higher density than horticultural oils. Heavier oils are more toxic to insects than lighter oils, perhaps because they evaporate slower than lighter oils. Consequently, they are in contact with the target insect for a longer time. However, heavier oils also are more toxic to plants, probably for the same reason. Last, viscosity is another parameter that can affect plants. Viscosity is expressed in seconds and represents the time needed for the drop of oil to pass through a standard opening. This relates to the time the oil is exposed to effectively cover the plant before its breakdown. The values for dormant oils are from 90 to 150 seconds. The values for horticultural oils range from 65 to 90. To be on the safe side, oils with values from 65 to 70 seconds should be used during the growing season.

Consideration of dormant applications

Properly identify the pest. Dormant applications only work for arthropod pests that overwinter on the plant. Also, dormant applications of oils may be less effective on insects that overwinter in egg clusters with multiple layers. The oil application will only kill the top layer of eggs.

Read the label, use proper rates and know your plants. The rates of horticultural oil will vary between dormant and growing season. In contrast, dormant oils can only be used during the dormant season. Some plants are sensitive to dormant oils when they are newly transplanted or under drought stress.

Check the weather. Only apply dormant oils when temperatures will remain above freezing for at least 24 hours.

Achieve excellent coverage. Dormant oils will only be effective if they are in direct contact with the pest at the correct life stage.

About IPM Chronicle

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