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Rose Downy Mildew

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Rose downy mildew disease is caused by *Peronospora sparsa*, an obligate biotrophic oomycete. This disease is one of the most destructive diseases of rose plants and attacks all types of roses in greenhouse, nursery and landscape settings. Although rose downy mildew does not infect other ornamentals, *P. sparsa* can also infect other species of *Rubus* that include blackberry, raspberry and boysenberry plants. The stems, leaves, sepals, calices and peduncles of the plant are all susceptible to infection, the symptoms of which are mostly found in the stems and leaves of the plant (1).

Symptoms

Early symptoms include yellow spots or lesions on the upper area of the leaf. The spots or lesions may turn purple, red or black overtime and will boarder along the veins of the leaf (Figure 1). Downy mildew can easily be confused with black spot; however, lesions tend to begin near or at the bottom of the infected plant whereas in downy mildew the infection will begin to show symptoms around the top part of the plant. Defoliation may occur before the lesions become visible on the leaves. Lesions may also become necrotic in dry conditions (Figure 2).

Figure 1. Downy mildew on rose

Disease cycle

The reproductive structures of downy mildew (sporangia) can usually be found on the undersides of the leaves. The sporangia can spread by air currents and water splashing from an infected plant onto a nearby healthy plant. The ideal temperature for the spread of rose downy mildew pathogen is cool, wet weather (between 59° to 64 °F) and in high humidity around 85% or greater (2, 3). Symptoms usually occur rapidly after infection depending on environmental conditions. This timespan can last anywhere from a few days to weeks before symptoms are seen (4).

Disease management

Roses or caneberries (brambles) planted in landscapes and nurseries , as well as in borders around greenhouse and high tunnel production sites are all possible sources of a rose downy mildew outbreak. Sanitation practices are critical for disease management for all types of production. Remove plant debris from both current and previous seasons to avoid spread of the inoculum. Collected debris should be buried or burned off site. Inspect newly purchased plants before adding them to your inventory. Increase air circulation and reduce excess moisture by thinning canes and reducing foliage where possible. Proper spacing will also improve air circulation and help prevent spread of the disease. Scouting and early diagnosis of infected plants are critical for preventing the spread of downy mildew disease and implementing effective disease control strategies. If you would like to confirm that downy mildew has infected your roses, you can submit a sample to your local university's plant diagnostic laboratory.

The Tennessee State University (TSU) Ornamental Pathology Program conducted a study to evaluate systemic fungicide drench applications for the control of downy mildew of roses. Treatments were Segovis 1.67SC (1.0 fl oz/100 gal and 3.0 fl oz/100 gal) (a.i. oxathiapiprolin), Subdue Maxx 22ME (2 fl oz/100 gal) (a.i. mefenoxam), Plentrix SC (2.75 fl oz/100 gal) (a.i. azoxystrobin + mefenoxam) and Inosco 4.2L (20 fl oz/100 gal) (a.i. potassium phosphite). Treatments were applied as a drench at the first signs of downy mildew with a volume of 20 fl oz per 3-gallon nursery container. All fungicide treatments significantly reduced the final disease severity rating, slowed disease progression, limited the incidence of downy mildew, and reduced the average number of infected leaves compared to the non-treated control (5). The severity of downy mildew as well as disease progression among fungicide-treated plants were significantly lower in plants treated with the higher rate of Segovis. Additionally, all treatments resulted in significantly taller and wider plants compared to the non-treated control. Benefits of using drench application of systemic products in a treatment program were clear; one application provided excellent protection to rose plants for 30 days.

Figure 2. Common symptoms of rose downy mildew- red brown spots and necrotic lesions on mature leaves

Pathogen resistance to fungicides is becoming more common and the performance of many fungicides has been affected to some degree by pathogens that develop resistance. So, using different mode of action fungicides in a rotation program is an important step toward reducing risk of resistance development. In 2016, the TSU Ornamental Pathology Program conducted another study to evaluate fungicide rotations at 7- or 14-day spray application intervals for the control of downy mildew on roses. The initial fungicide application was Subdue Maxx 22ME (2 fl oz/100 gal) (a.i. mefenoxam) and Micora 23.3SC (4 fl oz/100 gal) (a.i. mandipropamid) and made after observing the first symptoms of downy mildew disease on the Pink Double Knock Out® roses. Then, Mural 45WG (7 oz/100 gal) (a.i. benzovindiflupyr + azoxystrobin) and Segovis 1.67SC (2 fl oz/100 gal) (a.i. oxathiapiprolin) were alternated at 7- or 14-day application intervals. Both fungicide rotation programs equally and significantly reduced downy mildew incidence, as well as the average number of infected leaves per plant, when compared to the non-treated control (6). Plants in the 7-day rotation program were also significantly taller compared to the non-treated control plants. Whether using drench or spray applications, control of downy mildew disease in roses relies on making preventive fungicide applications at times when the weather or environmental conditions are conducive to disease development. Typically spray applications are made on a 7- or 14-day interval, depending upon the level of disease pressure. By incorporating products that have both translaminar and systemic activity in fungicide rotation with protectant fungicides (a.i. azoxystrobin, oxathiapiprolin, mandipropamid, benzovindiflupyr + azoxystrobin, azoxystrobin + mefenoxam, cyazofamid, dimethomorph, mancozeb/copper hydroxide, mefenoxam, phosphonate) growers can likely extend their treatment interval while maintaining good protection.

References

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