

Taking Control of *Botryosphaeria* in California Walnut Orchards

Summary

THE ISSUES:

Botryosphaeria, or *Bot*, is a fungal disease that spreads by spores that germinate and enter the tree through existing wounds or scars, such as those from scale infestation, pruning, leaf and fruit drop or bud scars.

THE THREAT:

The disease leads to dieback in shoots and fruiting buds and an overall decline in walnut tree health.

THE SOLUTION:

Luna Sensation® and *Luna Experience*® are fungicide options that are highly effective in controlling *Bot* fungi, while *Movento*® insecticide provides effective control of scale and other major insects and mite pests to prevent tree damage that allows *Bot* infection.

Taking Control of *Botryosphaeria* in California Walnut Orchards

Heavy rainfall in early 2017 has provided relief to California walnut producers after years of drought. However, that much-needed moisture could spur an even faster spread of walnut *Botryosphaeria*, or *Bot*, a disease which is difficult to diagnose and spreads quickly during wet weather conditions. *Bot* causes a dieback in shoots and fruiting buds and an overall decline in tree health.

Botryosphaeria are a group of fungal pathogens that have been well known for decades in the California pistachio industry, with initial discovery in 1984 and significant production loss to the disease in the late 1990s. However, *Bot* pathogens have emerged as a growing challenge to walnut tree health and yields in California in the past three to four years. In walnuts, *Bot* can easily spread from tree to tree by wind or water, and spores germinate with a quarter-inch of rain or as little as 90 minutes of exposure to water.

“Even in the dry years, the disease has spread,” said Chuck Gullord, Bayer technical sales representative. “No one really knows what will happen in a year with consistent rains and warm temperatures.”

The disease has a multiseason impact on orchards. *Bot* infects and damages the current year’s fruit and, the following season, the infected fruit wood does not put on buds.

“In some mature walnut orchards, we’ve seen yield declines of 25 percent or more in the first year, with additional declines the second year and potentially devastating impacts to the health of trees in the orchard,” said Gullord.

Chemical control programs are highly effective in controlling Bot fungi as well as scale and other damaging insects that allow the disease to spread.

Research at the University of California confirms the potential economic and yield impacts as well. In a Butte County, California, orchard during the 2016 growing season, about 30 percent of fruit in untreated trees was blighted and lost for that season's harvest, according to Dr. Themis Michailides, professor and plant pathologist at the University of California, Davis. In addition, 11.2 percent of spurs were blighted and killed, representing a loss of four to six fruit per spur for the next growing season.

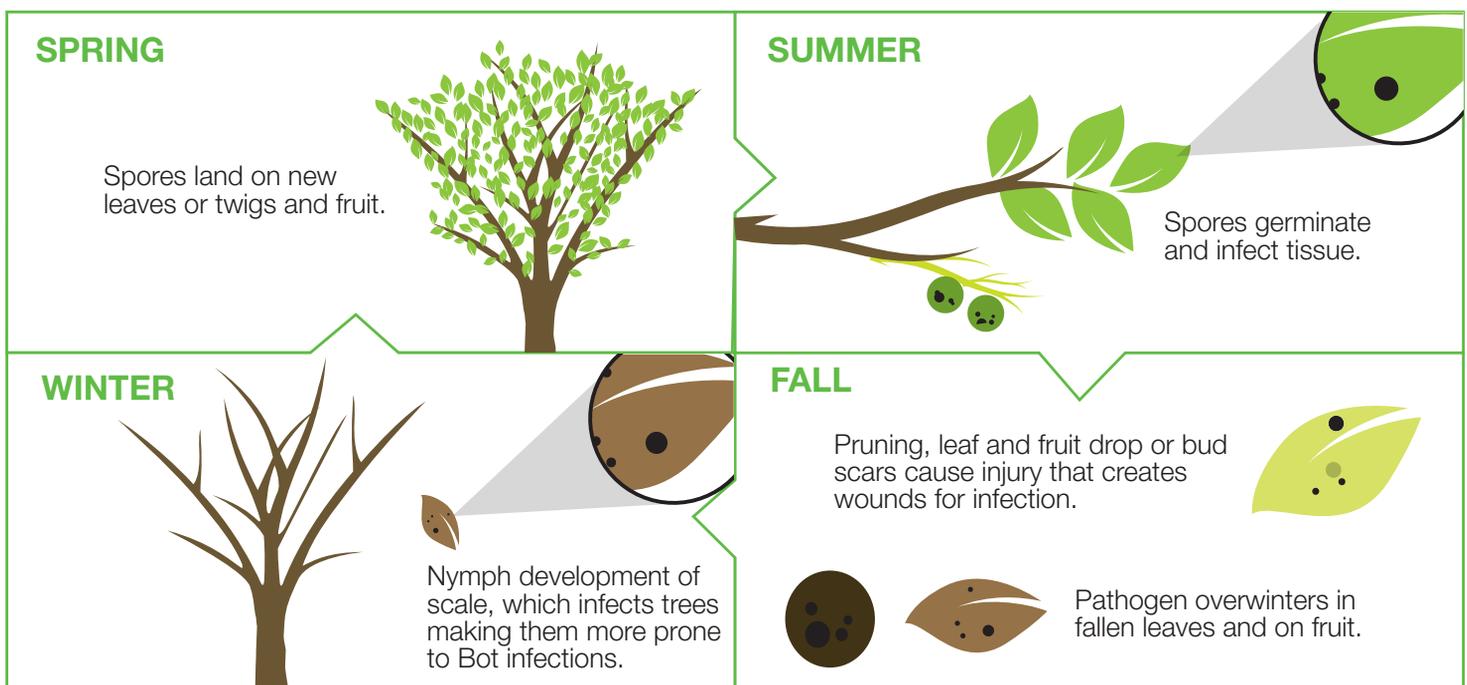
Infection Enters Through Scale Damage and Tree Wounds

Botryosphaeria spores germinate and enter the tree through existing wounds or scars, such as those from pruning, leaf and fruit drop or bud scars. Research conducted by the University of California in 2014 found that untreated wounds can be susceptible to infection from Bot fungi for extended periods. For example, pruning wounds on medium to large branches can be infected for at least four months after the pruning cut is made.¹

While walnut scale damage has historically not been considered a significant economic threat to walnut production, the lesions on trunks and old branches caused by scale are a key entry point for Bot infection. Walnut trees with scale infestations are 60 to 70 percent more prone to Bot infection.

Disease Spreads Quickly in Warm, Wet Conditions

In order to germinate, Bot spores require temperatures above 50 degrees Fahrenheit and exposure to moisture. Infection can quickly lead to cankers with the right environmental conditions. Researchers have found that cankers can grow in 7 to 10 days at temperatures above 80 degrees F!



When *Botryosphaeria* spores germinate, mycelia enter the fruit husk and grow through tissues quickly; however, tissue death isn't visible until late summer or early fall. The mycelia also spread internally up into peduncles and onto shoots and branches. Infected spurs will darken and die, resulting in both thinned canopies and the death of next year's buds. Infected tissues then become sources of spores to be spread by wind or water.

Identification of Bot infection in walnut trees can be difficult because other diseases such as Walnut blight show similar symptoms.

Identification of Bot infection in walnut trees can be difficult compared to identifying the disease in pistachio and other trees, because other diseases such as Walnut blight show similar symptoms. The symptoms can also be confused with frost damage or winterkill in some circumstances.

Bayer began sponsoring a walnut Bot sampling program in 2014 to help California walnut growers and Pest Control Advisors (PCAs) better identify Bot symptoms and prevent the spread of the disease in orchards. Bayer representatives, PCAs or growers took random samples of leaves in the orchard, then sent them to a laboratory for testing. The results enabled growers to diagnose whether Bot was present in their orchards as well as the percentage of infection to help build a treatment plan.

"About 75 percent of trees sampled were infected at a point that required treatment," said Gullord.

"The sample results were helpful to growers and PCAs to be able to confirm the presence of Bot, since many of the symptoms are similar to what they could see from Blight, poor nutrition or other issues."

Controlling Walnut Bot

Walnut growers can preserve the health and longevity of walnut orchards and prevent the spread of Bot with a combination of cultural controls and chemical solutions. Together, these methods can control both *Botryosphaeria* pathogens and damaging insects that make the trees more susceptible to the disease.

Cultural practices:

- Prune to remove disease cankers, blighted fruit and shoots, dead branches and other infected wood.
- Perform pruning at least one month prior to a rain event.
- Avoid sprinkler irrigation methods that can wet the canopy.
- Monitor natural enemies of walnut scale (predatory beetles *Chilocorus orbus* and *Cybocephalus californicus* and *Aphytis*, a predatory wasp)

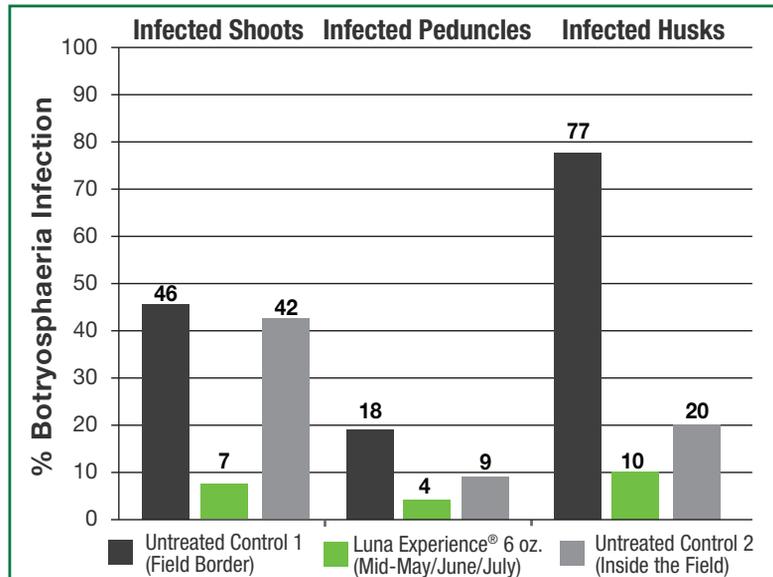
Chemical controls:

Bayer provides fungicide solutions Luna Sensation® and Luna Experience® that are highly effective in controlling Bot fungi.

- Movento® insecticide provides effective control of scale and other major insects and mite pests to prevent tree damage that allows Bot infection.
- Luna fungicide also provides effective control of *Botryosphaeria* panicle and shoot blight in pistachio production. [Learn more here.](#)

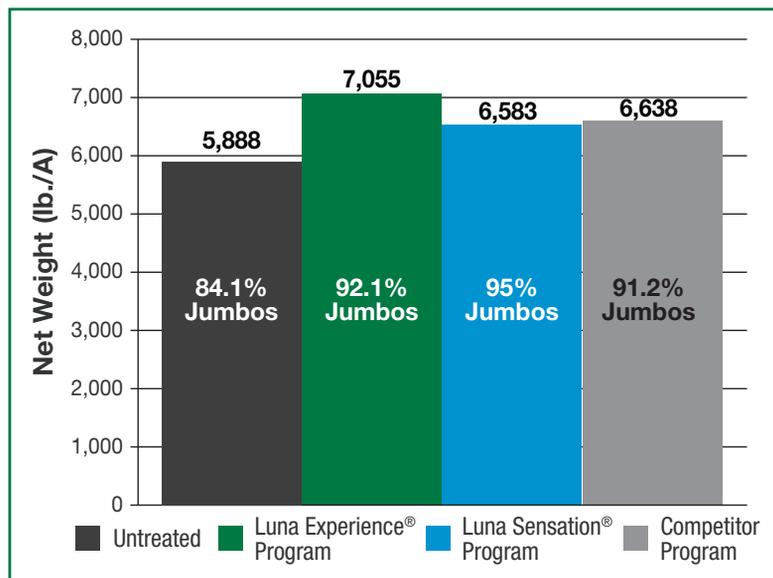
“In some mature walnut orchards, we’ve seen yield declines of 25 percent or more in the first year, with additional declines the second year and potentially devastating impacts to the health of trees in the orchard.”

Research trials conducted by the University of California in 2013 showed a significant decrease in infected shoots, peduncles and husks compared to untreated controls with the application of Luna Experience® in mid-May, June and July.



Efficacy of Luna Experience® against *Botryosphaeria* canker and blight measured as incidence of *Botryosphaeriaceae* recovered from plated current-growth tissues (shoots, peduncles and husks). Dr. Themis Michailides, et al., 2013.

In addition, walnut trees in a university/grower large plot trial treated with Luna Experience® and Luna Sensation® programs delivered 1,167 and 695 pounds per acre of increased walnut yields compared to untreated controls.

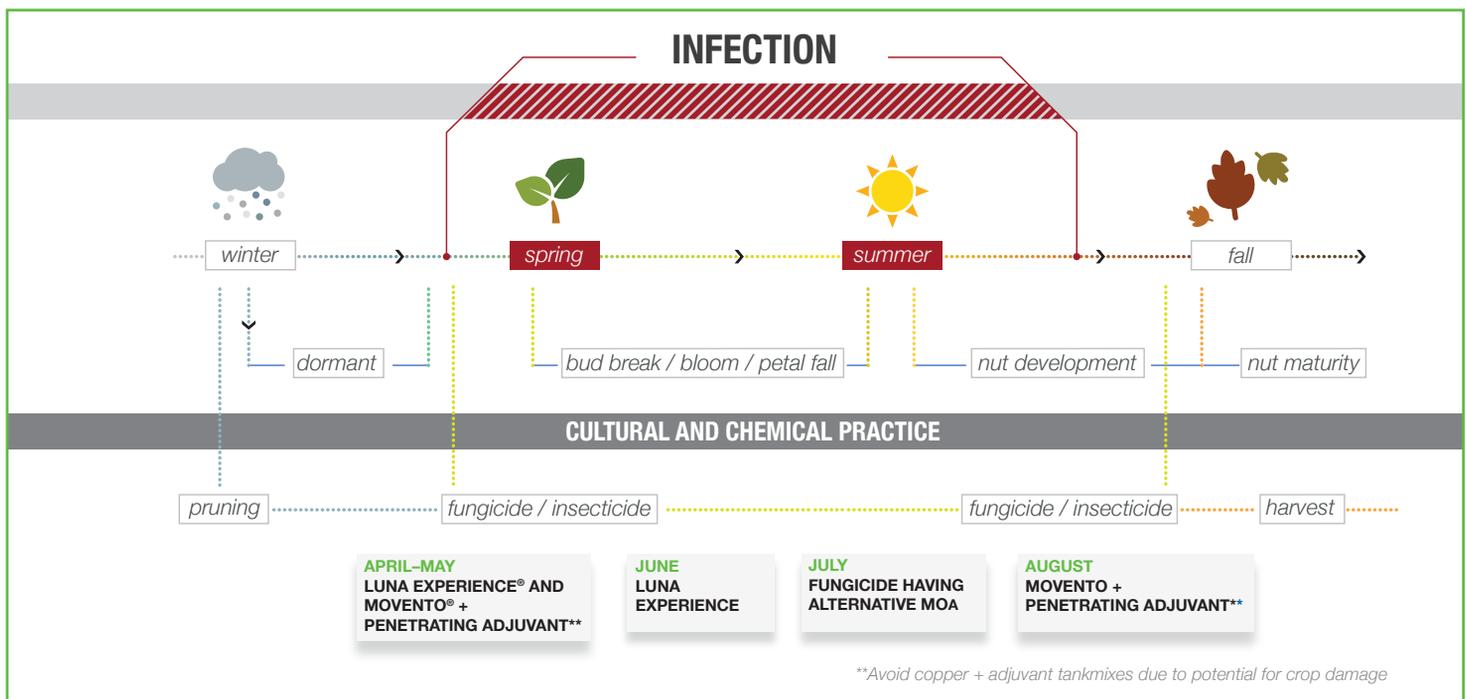


Yield (lb.) and percent jumbos in a university/grower large plot trial at Modesto, CA, 2014. Andy Alderson (Modesto Junior College) and Dr. Themis Michailides. Tulare variety, planted 2004. Applications on 4/16, 5/15, 6/25, 7/25 and 10/30. Harvest on 9/29. Plots: 11 rows, 2 rows harvested per plot.

Recommended application timing

- In **April**, apply **Luna Sensation** or **Luna Experience**. Talk with your Bayer representative or PCA about which Luna® formulation will best meet your needs.
- In **May and June**, pair **Movento** with Luna Sensation or Luna Experience. The best control of scale is expected in May once leaf flush is at least 60 percent, which also coincides with root flush for nematode and aphid control.
- In **July**, apply Luna Sensation or Luna Experience.
- Following harvest, an application of Luna Experience may be needed in orchards with severe Bot infestation.

Bayer Walnut *Botryosphaeria* program



¹http://cesutter.ucanr.edu/newsletters/Sacramento_Valley_Walnut_News55088.pdf

© 2017 Bayer CropScience LP, 2 TW Alexander Drive, Research Triangle Park, NC 27709. Always read and follow label instructions. Bayer, the Bayer Cross, Luna, Luna Experience, Luna Sensation, and Movento are registered trademarks of Bayer. Luna and Movento are not registered for use in all states. For additional product information, call toll-free 1-866-99-BAYER (1-866-992-2937) or visit our website at www.CropScience.Bayer.us.