

# Management of Angular Leaf Spot of Strawberry

## Introduction

Angular leaf spot (ALS) is a bacterial disease of strawberries that primarily affects the leaves and calyces (caps) of developing fruit. Early symptoms appear as small water-soaked lesions on the lower side of leaves that have an angular appearance and are translucent when held up to a bright light (see image upper right). The disease can also affect the caps of developing berries, turning them progressively darker until they become potentially unmarketable (see image lower right).

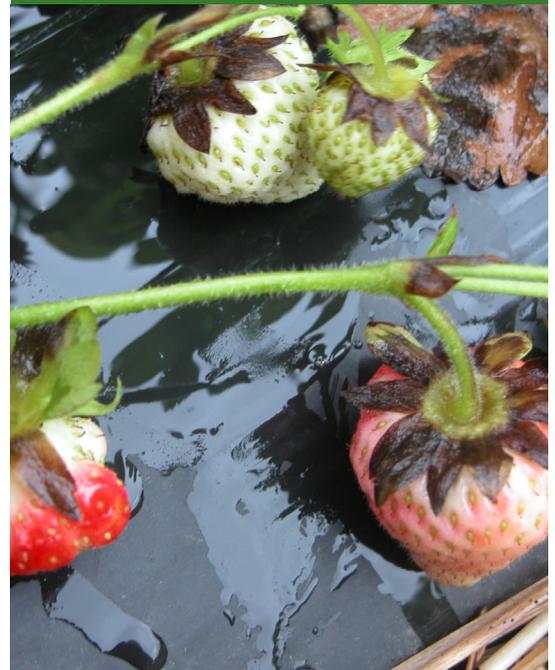
ALS is caused by a bacterium (*Xanthomonas fragariae*) that can survive for long periods (overwinter) in infected strawberry debris. Once the debris has decomposed, the bacteria are no longer viable. In the spring, the bacteria are splashed about and infect new leaves and calyces of developing fruit. The bacteria thrive in conditions of high moisture from rain and overhead irrigation. The optimum temperature for bacterial growth in plant tissues is 20-25°C, it is slow at 10 and 30°C and does not grow at 5°C. Infection occurs through stomata on the undersides of leaves and calyces. During cool temperatures in spring time, it takes about 3-4 weeks for symptoms to appear after infection occurs, but sooner if temperatures are warm. Symptoms often begin to appear at about the time when berries begin to ripen, but the actual infection occurred several weeks earlier.

## Management

1. Management of this disease begins with clean plants from a certified nursery to minimize the likelihood of introducing the bacteria into a field. If ALS has become a problem, there are several practices that can be followed to reduce the effects of this disease, but it is impossible to eradicate the disease from a field once it has become established.
2. The disease is often associated with wet conditions following frost protection in spring. Although frost protection is essential to protect flowers, excessive levels of irrigation should be avoided. During dry periods, excessive irrigation should be similarly avoided and should be done during the early morning so that the plants will dry quickly.
3. Weeds should be kept to a minimum to aid in good air movement and faster drying.
4. Avoid movement of equipment and workers through a field when the foliage is wet since this will help to spread the bacteria.
5. Avoid over fertilization as the bacteria thrive in lush growth.
6. If there are well defined areas where the disease is observed, removal of debris at renovation will help to reduce the amount of overwintering inoculum. However, this may not be practical on a large scale.



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## Fungicide Application

Fungicides applied for other diseases will not help with angular leaf spot since this disease is caused by a bacterium. Early season sprays of Copper 53W (copper sulfate) for control of common leaf spot may also control ALS, or Tivano (citric and lactic acid) may help to protect developing leaves and berries from early season infection, though the success of this may be limited.

Sprays should be applied during early flower development to protect the caps. Good spray coverage of the foliage is essential since the bacteria infect the undersurface of leaves. Drop nozzles are recommended.

Copper 53W should not be applied when temperatures exceed 23-25°C as this may cause phytotoxicity which appears as a reddening of the foliage. More than 4 applications of Copper 53W may also lead to phytotoxicity. The purpose of sprays is to protect the foliage during wet weather, so if there is a dry period, spray applications are not necessary and can be saved for when they are needed.

Tivano is a new product and grower experience is limited, but it may be more effective than Copper 53W. It is advisable to do some small scale testing of new growth after renovation to evaluate plant tolerance to Tivano in preparation for the following season.

*Perennia management schedules are regularly updated. Producers are advised to check them for up to date pest information.*

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*Photo Credit:*

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June 2016