

Effect of different types of adjuvants on angular leaf spot incidence and yield

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Summary

Influence of different types of adjuvants on the management of angular leaf spot of strawberry was evaluated by conducting a field trial during the 2017-18 strawberry season. None of the treatments reduced leaf blight. However, Silwet L-77 and Silicone 100 increased the number of symptomatic leaves. Furthermore, both adjuvants also increased the percentage of fruits with brown cap and reduced yield compared to the non-treated control. These results support the hypothesis that organosilicone adjuvants increase the incidence of angular leaf spot on strawberry when the pathogen is present in the field and weather conditions are favorable.

Methods

Bare-root transplants from a Canadian nursery were planted on 12 Oct 2017 on plastic-mulched raised beds previously fumigated with Telone C-35 (300 lb/A). The trial was conducted at the Gulf Coast Research and Education Center. Irrigation, fertilization and planting set up were carried out following local growers' standards. Plots were 8 ft long and contained 14 plants in two staggered rows 12 in. apart with 12 in. in-row spacing. Seven adjuvant treatments were arranged in a randomized complete block design with four adjacent beds as blocks. To ensure the presence of the pathogen, two center plants in each plot were spray inoculated with a mixture of *X. fragariae* isolates plus 0.1% Tween 20 on 23 Oct. Treatments

were applied weekly as foliar sprays from 22 Nov to 9 Feb (12 applications). Applications were made with a CO₂ backpack sprayer delivering 100 gal/A at 60 psi through two hollow cone nozzles. Fruit were harvested and graded twice a week from 21 Dec 2017 to 12 Feb 2018 (13 harvests). Marketable fruit were counted and weighed to determine yield. Non-marketable fruit, including those with moderate to severe brown cap symptoms, were enumerated. Incidence of brown-cap, a symptom of ALS on the fruit calyx, was expressed as a percentage of all fruit harvested. Between 14 and 16 Feb, 10 plants per plot were evaluated for angular leaf spot (ALS) severity using two methods. The number of necrotic leaves with moderate to numerous ALS lesions was recorded for each plant. On surviving leaves, counts were also made of the number of leaflets more than 10 % blighted by ALS. Overall ALS severity was calculated by adding the number of necrotic leaves to the number of blighted leaflets divided by three, since each strawberry leaf has three leaflets.

Results

Angular leaf spot incidence. Typical ALS lesions developed within one week of inoculation, but spread slowly due to dry weather. Experimental applications were delayed for one month after inoculation to allow ALS to become established. This occurred slowly at first, but accelerated rapidly

in Jan, a month with two rain events and two nights of overhead watering for freeze protection. None of the test products reduced leaf mortality or leaf blight due to ALS compared to the non-treated control. Silwet L-77 and Silicone 100, both silicone wetting agents sold as commercial spray adjuvants, increased the number of necrotic leaves and overall leaf damage. Other spray adjuvants such as Cohere, Kinetic, Symbiont Crop Enhancer, and Nu Film P did not markedly increase ALS severity.

Yield. Brown cap damage to fruit calyces occurred in late Jan and early Feb and was often, but not always associated with ALS spotting. Brown cap was very severe in the Silwet L-77 and Silicone 100 treatments, and contributed to their low yields. None of the other adjuvants significantly increased or decreased marketable yield compared to the non-treated control.

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Table 1. Yield, angular leaf spot and brown cap incidence on 7 different adjuvant treatments applied weekly to strawberries at the Gulf Coast Research and Education Center during the 2017-18 season.

Products and rates/A	Marketable fruit (lb/A)	% Brown cap	Necrotic leaves/plant	Blighted leaflets/plant	Total damaged leaves/plant ^z
Symbiont Crop Enhancer 1.5 pt	11701 ab	3.6 a	3.4 a	16.4 a	8.1 a ^y
Nu Film P 1 pt	13012 a	1.7 a	3.2 a	18.1 a	8.9 ab
Kinetic 0.75 pt	11255 ab	4.0 a	4.1 a	16.9 a	9.6 ab
Cohere 1 pt	10615 b	3.1 a	4.2 a	17.7 a	9.8 ab
D.W Surfactant 2 pt	12506 ab	4.6 a	5.2 a	19.7 a	11.8 b
Silwet L-77 1 pt	7295 c	25.2 b	9.3 b	20.2 b	14.9 c
Silicone 100 1 pt	5560 c	35.5 c	10.5 b	17.9 b	16.5 c
Control	12587 ab	1.6 a	3.5 a	15.9 a	8.8 a

^zTotal damaged leaves/plant is mathematically derived from the two primary ALS parameters: necrotic leaves/plant and blighted leaflets/plant.

^y Means followed by the same letter within a column are not significantly different by Fisher's protected LSD test ($\alpha = 0.05$).