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2021 Fungicide Screening for In-Season Strategies for Suppressing White Rot in Onions

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Introduction

Management of white rot disease in onions and garlic is focused on prevention, containment, reduction of inoculum before planting, and suppression with fungicides. Application of penthiopyrad (Fontelis) and/or tebuconazole (Tebustar) in-furrow at planting is the standard fungicide treatment for suppressing white rot in California. Numerous studies have shown these fungicides applied in a concentrated band at planting significantly reduce white rot severity in onions and garlic. Fungicide application in-furrow can prevent economic loss in years with low disease severity or in fields with low inoculum. Unfortunately, fungicides fall short of preventing economic loss in years when weather favors disease development or in fields with high inoculum levels. The reason fungicides fail to suppress white rot is thought to be related to decreasing fungicide concentration over time. Fungicide residue in-furrow decreases in the soil throughout the growing season for a variety of reasons including absorption to the soil, degradation by soil microbes, and leaching.

The objective of this study was to investigate methods for increasing fungicide levels in the soil during summer and early fall. The project investigated in-season banded fungicide application and the use of soil surfactants/penetrants with fungicides. In season banded applications were directed at the base of plants in each seed row at the time of cultivation 2 months after planting.

2021 Site Information

- **Soil type-** mucky silty clay loam-6.5% OM
- **Growing season-** May 6, 2021 to October 5, 2021
- **Irrigation –** solid-set sprinklers
- **Onions-** 36 inch beds with 4 seed-lines spaced 6 inches apart; 2-inch seed spacing; Senscient processing variety
- **Design-** RCB with 5 blocks (reps)

2021 Study Methods

In early May 2021, the field was rototilled and beds were shaped before onion planting. Fungicide treatments were applied in-furrow at planting time. In-furrow fungicides were applied using Teejet 8001 EVS nozzles @ 30 psi. The nozzles were mounted on the onion planter to apply a 3-inch band directly over the seed-line after seed placement but before furrow closure. In-season fungicide application occurred when onions were in the 5-6 leaf stage on 6-30-2021. Fungicides were applied with CO2 powered backpack sprayer using 80015 EVS drop nozzles placed 1 ft above the onion leaves at 50 GPA. Onion stand density was measured in each plot by counting the number of green onions in all seed lines for the entire plot length. Onion vigor (color, height, and leaf cover) was visually estimated in each plot using a 0 to 10 scale, with 10 = highest vigor. Late season visual leaf dieback ratings were taken starting 8-30-2021. The number of plants with leaf dieback per plot and a visual estimate of the percentage of total leaves with leaf dieback per plot was recorded. Onion yield was measured by harvesting all onions in each plot on 10-5-2021. Onions were run across a grade-line to remove loose soil and green tops. Onion bulbs were hand-sorted based on the presence of white-rot. A total weight was recorded for disease-free onions and onions with white-rot symptoms (decay through 1st scale, mycelium, or sclerotia).

Results

Spring and early summer weather was unusually hot and dry in 2021 (data not shown) which likely hampered early season white rot development. Fungicide treatments did not have an influence on spring onion stand or early season vigor (Table). This result suggests the fungicide treatments were safe on onions. The first sign of white rot mycelium growth and leaf dieback was in the last week of August. Leaf dieback in August and September was highest in the untreated control (Table). All fungicides had lower leaf dieback compared to the untreated control, but leaf dieback did not differ

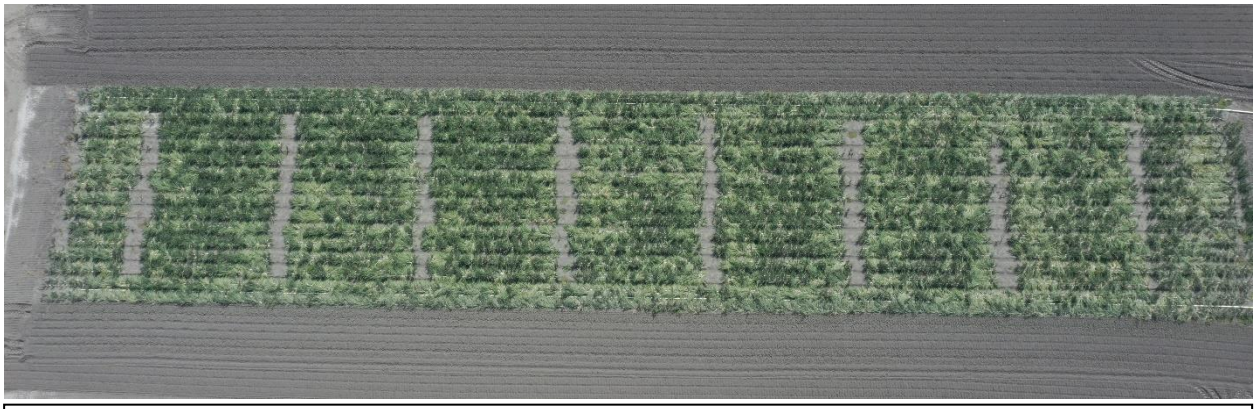

Figure. Drone photo of plot area late season at the start of onion lodging.

between fungicide treatments. This same trend occurred at harvest with all fungicide treatments having high disease-free yield and lower diseased yield compared to the untreated control. Total onion yield was similar across all treatments. Treatments with Tebustar applied in-furrow and Fontelis banded at the time of cultivation had the lowest diseased yield numerically, but this treatment trend was not statistically significant. All treatments including the untreated control had relatively low disease loss which was surprising as the field site had high sclerotia counts before planting. Additional

evaluation of in-season fungicides in a year with high disease severity is recommended as disease pressure was relatively low in 2021.

Table. Influence of Fungicides on Onions and White Rot Symptoms in Tulelake, CA 2021.

	Treatment	Product Rate	Application time	Onion stand	Onion vigor 4-leaf stage	Onion vigor 7-leaf stage	Leaf dieback 8/30	Leaf dieback 9/13	% leaf dieback 9/13	Disease-free bulb yield	Diseased bulb yield	Total bulb yield
				plants/ bed ft	1-10 scale; 10=best		% of plants		% total leaves	ton/acre		
1	Untreated	n/a	n/a	22.44a	7a	8a	1.13a	4.64a	15.8a	21.86b	3.71a	25.58a
2	Tebustar	20.5 fl oz	in Furrow	24.65a	7.2a	8a	0.14b	0.84b	6b	26.15a	0.77b	26.92a
3	Fontelis	24 fl oz	in Furrow	23.67a	7.2a	8a	0.1b	1.63b	7b	26.55a	1.03b	27.58a
4	Pyraziflumid 20sc	6.2 fl oz	in Furrow	22.81a	7.2a	8a	0.18b	1.42b	6.7b	25.31ab	1.4b	26.71a
5	Tebustar	20.5 fl oz	in Furrow	23.2a	7a	8a	0.15b	0.62b	7.2b	26.35a	0.39b	26.74a
5	Fontelis	24 fl oz	banded spray at cultvation									
6	Fontelis	24 fl oz	in Furrow	23.46a	7.6a	8a	0.15b	1.05b	5b	26.29a	0.9b	27.18a
6	Fontelis	24 fl oz	banded spray at cultvation									
7	Tebustar	20.5 fl oz	in Furrow	23.53a	7a	8a	0.04b	0.37b	5.2b	26.84a	0.35b	27.19a
7	Fontelis	24 fl oz	banded spray at cultvation									
7	WE Advantage	16 fl oz	banded spray at cultvation									
8	Tebustar	20.5 fl oz	in Furrow	22.5a	7.2a	8a	0.02b	0.75b	4b	26.6a	0.34b	26.94a
8	WE AquateMax	32 fl oz	in Furrow									
8	Fontelis	24 fl oz	banded spray at cultvation									
8	WE Advantage	16 fl oz	banded spray at cultvation									

Treatment means with the same letters within columns are not statistically different using Tukey HSD mean comparison test.

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