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## Effect of Fungicides on Processing Onion Seedling Vigor, Yield, and Incidence of White Rot

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**Objectives:**

- Determine the influence of fungicides on onion vigor and yield
- Evaluate fungicide efficacy at preventing the incidence of white rot.

**Procedures:** The Folicur Trial was planted on April 23, 2009 with Sensient 7782 onion dehydrator seed, using a custom two-row plot planter. Plot size was 6 feet (2 beds) by 25 feet. All treatments were applied at planting except for treatments #10 and #11 which were power tilled into the soil the day before planting. Onions were grown using UC-IPM recommended management practices for irrigation, fertility, and pest management. Stand counts and vigor ratings were taken throughout the early growing season on May 19th, May 26th, and June 8th (Table 1). Stand counts were taken by counting the number of onion seedlings in the middle two seed rows (4 seed rows per bed) in both beds within the middle 10ft of each plot. Vigor ratings were a visual observation throughout the entire plot and were taken on May 26th, June 8th, and July 7th (Table 1). The trial was harvested on October 6, 2009. Plots were harvested by using a two-row layup machine. One row of each plot, 21.5 feet long, was boxed into crates and clean onions and onions with white rot (dirty) were sorted and weighed (Table 2).

The Switch and Endura Trial was planted late in the season on May 21st with the same seed, custom planter, and plot size as the earlier planted trial. All fungicide treatments were applied during planting. Stand counts and vigor ratings were taken on June 18th, June 25th, and July 7th using the same evaluation method as the earlier planted trial (Tables 3 & 4). One row of each plot, 21.5 feet long, were boxed into crates and clean onions and onions with white rot (dirty) were sorted and weighed (Table 5).

**Results:** In the early planted trial, most fungicide treatments did not differ significantly from the untreated control with regard to stand and early season vigor. The only exceptions were the banded Folicur treatment at 11.3 oz/acre and the Folicur seed coat treatment. Early season vigor for the banded Folicur at 11.3 oz/acre treatments was slightly higher than untreated plots. The Folicur seed coat treatment cause unacceptable injury to onion seedlings and decrease both stand and vigor compared to untreated plots (Table 1). Several fungicide treatments had higher clean onion yield (onions without white rot symptoms) compared to the untreated control (Table 2). The banded Folicur treatments at 11.3 and 20.5 oz/acre had the highest clean yield. Folicur at 11.3oz/acre banded with or without Bioforce had significantly higher total yield compared to untreated plots (Table 2). The only fungicide treatments with clean yield not greater than the untreated control where the banded Endura treatment and Folicur power-till treatments (Table 2).

In the Switch and Endura trial, no fungicide decreased stand establishment. Onion stand density actually increased in the banded Endura treatment at the 6.8 oz/acre broadcast rate (Table 3). Banded Folicur at the 20.5 oz/acre broadcast rate was the only treatment to decrease early-season plant vigor compared to the untreated control (Table 4). Endura band-applied at the 6.8 oz/acre broadcast rate increased total yield compared to the untreated control (Table 5). Endura at 6.8 oz/acre broadcast and Folicur at 20.5 oz/acre broadcast increased clean onion yield compared to the untreated control. While these treatments had significantly higher clean yield compared to the untreated plots, over 40% of the onions showed white rot symptoms at harvest. The Endura banded treatment at the 6.8 oz/acre band rate had the lowest clean yield suggesting high rates of Endura may be preferred for suppression of white-rot (Table 5).

**Table 1:** Early Planted White Rot Trial: Stand Count and Vigor Rating Evaluations, Tulelake, 2009.

| Treatment # | Fungicide | Product Rate/A[1] | Application | Type | 6/08/09 Stand Count | 5/26/09 Vigor Rating[2] | 6/8/09 Vigor Rating | 7/7/09 Vigor Rating |
|---|---|---|---|---|---|---|---|---|
| 1 | Folicur | 20.5 oz | Band | Liquid | 19.6 | 2.7 | 1.8 | 4.0 |
| 2 | Folicur Stimulate | 20.5 oz 4 oz | Band | Liquid | 18.9 | 2.8 | 2.2 | 4.2 |
| 3 | Folicur Bio-Force | 20.5 oz 8 oz | Band | Liquid | 21.1 | 2.7 | 2.2 | 4.2 |
| 4 | Folicur | 11.3 oz | Band | Liquid | 26.4 | 3.8 | 3.2 | 4.7 |
| 5 | Folicur Stimulate | 11.3 oz 4 oz | Band | Liquid | 20.7 | 2.8 | 2.2 | 3.7 |
| 6 | Folicur Bio-Force | 11.3 oz 8 oz | Band | Liquid | 23.5 | 3.3 | 2.8 | 4.3 |
| 7 | Folicur | 5 oz | Band | Liquid | 23.3 | 3.0 | 2.0 | 4.3 |
| 8 | Endura | 6.8 oz | Band | Granular | 19.8 | 3.0 | 2.3 | 3.7 |
| 9 | Folicur | | Seed Coat | Coat | 10.7 | 1.5 | 1.0 | 3.2 |
| 10 | Folicur | 20.5 oz | Power Till | Liquid | 22.5 | 3.2 | 2.3 | 4.2 |
| 11 | Folicur | 11.3 oz | Power Till | Liquid | 21.5 | 3.3 | 3.2 | 4.3 |
| 12 | Untreated | | | | 21.1 | 3.0 | 2.3 | 3.8 |
| LSD (P=0.05) | | | | | 6.5 | 0.67 | 0.66 | 0.73 |

1= Banded rate for band treatments and broadcast rate for powertill treatments.
2= Vigor Rating Scale 0-5 (0= stand death to 5= most vigorous stand in trial)

**Table 2:** Early Planted White Rot Trial: Onion yield and White-rot Suppression, Tulelake, 2009.

| Treatment # | Fungicide | Product Rate/A[1] | Application | Type | Total Yield Tons/ Acre | Clean Yield Tons/ Acre | Yield w/rot Tons/ Acre | % Clean |
|---|---|---|---|---|---|---|---|---|
| 1 | Folicur | 20.5 oz | Band | Liquid | 14.39 | 9.79 | 4.61 | 67 |
| 2 | Folicur Stimulate | 20.5 oz 4 oz | Band | Liquid | 14.38 | 11.57 | 2.81 | 80 |
| 3 | Folicur Bio- Force | 20.5 oz 8 oz | Band | Liquid | 14.96 | 10.8 | 4.16 | 73 |
| 4 | Folicur | 11.25oz | Band | Liquid | 15.95 | 10.98 | 4.97 | 70 |
| 5 | Folicur Stimulate | 11.25oz 4 oz | Band | Liquid | 13.86 | 10.02 | 3.84 | 74 |
| 6 | Folicur Bio-Force | 11.25 oz 8 oz | Band | Liquid | 15.79 | 10.25 | 5.53 | 65 |
| 7 | Folicur | 5 oz | Band | Liquid | 14.97 | 9.61 | 5.36 | 63 |
| 8 | Endura | 6.8 oz | Band | Gran ular | 12.12 | 6.67 | 5.45 | 57 |
| 9 | Folicur | | Seed Coat | Coat | 10.17 | 7.79 | 2.98 | 72 |
| 10 | Folicur | 20.5 oz | Power Till | Liquid | 14.19 | 8.17 | 6.02 | 58 |
| 11 | Folicur | 11.25 oz | Power Till | Liquid | 14.34 | 6.68 | 7.66 | 48 |
| 12 | Untreated | | | | 11.58 | 6.14 | 5.44 | 53 |
| LSD (P=.05) | | | | | 3.82 | 2.69 | 2.47 | 12 |

1= Banded rate applied as product rate per acre.

**Table 3:** Late-planted White Rot Trial: Effect of Banded Fungicide Applications under Seed Rows on Stand Establishment, Tulelake, 2009.

| Fungicide | Rate | 6/18/09 | 6/25/09 | 7/7/09 |
|---|---|---|---|---|
| None | | 29.4 | 29.8 | 33.0 |
| Switch | 1 oz.1000 ft of row | 29.5 | 33.1 | 35.4 |
| Switch | 14 oz/A (broadcast rate) | 29.1 | 32.1 | 34.6 |
| Endura | 6.8 oz/A (banded rate) | 32.4 | 33.1 | 35.6 |
| Endura | 6.8 oz/A(broadcast rate) | 38.0 | 41.9 | 42.8 |
| Folicur | 20.5 oz/A(banded rate) | 33.3 | 37.9 | 39.1 |
| Folicur | 20.5 oz/A(broadcast rate) | 28.6 | 32.3 | 34.8 |
| LSD, P=0.05 | | 5.83 | 8.07 | 6.75 |

**Table 4:** Late Planted White Rot Trial: Effect of Banded Fungicide Applications under Seed Rows on Seedling Vigor (scale=0-5 where 0=seedling death to 5=most vigorous plant in trial), Tulelake, 2009.

| Fungicide | Rate | 7/7/09 |
|---|---|---|
| None | | 4.0 |
| Switch | 1 oz.1000 ft of row | 4.0 |
| Switch | 14 oz/A (broadcast rate) | 4.0 |
| Endura | 6.8 oz/A (banded rate) | 3.8 |
| Endura | 6.8 oz/A(broadcast rate) | 4.0 |
| Folicur | 20.5 oz/A(banded rate) | 4.0 |
| Folicur | 20.5 oz/A(broadcast rate) | 3.3 |
| LSD, P=0.05 | | 0.39 |

**Table 5:** Late Planted White Rot Trial: Fungicide Treatments, Onion yield and White Rot Control, Tulelake, 2009.

| Treatment # | Fungicide | Product Rate | Application | Total Yield Ton/Acre | Clean Yield Ton/Acre | Dirty Yield Ton/Acre | % Clean |
|---|---|---|---|---|---|---|---|
| 1 | Untreated | | | 6.79 | 2.46 | 4.33 | 36 |
| 2 | Switch | 1 oz/ 1000ft of row (banded rate)[1] | Band | 6.98 | 2.22 | 4.76 | 32 |
| 3 | Switch | 14 oz/A (broadcast Rate)[2] | Band | 7.67 | 3.30 | 4.37 | 44 |
| 4 | Endura | 6.8 oz/A (banded rate) [1] | Band | 6.69 | 1.34 | 5.35 | 21 |
| 5 | Endura | 6.8 oz/A (broadcast rate) [2] | Band | 8.85 | 4.12 | 4.74 | 46 |
| 6 | Folicur | 20.5 oz/A (banded rate) [1] | Band | 7.72 | 3.56 | 4.16 | 46 |
| 7 | Folicur | 20.5 oz/A (broadcast rate) [2] | Band | 7.75 | 4.49 | 3.26 | 58 |
| LSD (P=.05) | | | | 1.85 | 1.48 | 1.78 | 17.4 |

1= Banded rate, fungicide applied as correct product rate per acre.
2= Broadcast rate, fungicide applied at rate as if it were broadcast over the onion bed.