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2018 Field Plot Summaries for Oat and Sorghum Foliar Disease Management Trials

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SUMMARY

An oat crown rust integrated management trial and a sorghum foliar fungicide trials were conducted to determine the efficacy of fungicides to manage crown rust and fungal diseases in oat and sorghum respectively. Crown rust is one of the most devastating diseases of oat in the state. Stragego fungicide was applied at three different timings to determine the most effective timing for crown rust management. For sorghum, the study investigated the efficacy of two different rates of Nexicor for managing sorghum foliar diseases. The oat field experiment was maintained at Northeast Research Farm (NERF), Southeast research farm (SERF) and Volga research farm. The sorghum experiment was at Volga.

Treatments for the crown rust included application of Stratego fungicide at flag leaf, after heading (within 4 days of heading), and application when significant crown rust was developing on lower leaves preceding scouting, a strategy referred to as integrated disease management (IDM). Due to unfavorable weather conditions, crown rust appeared post maturity at Southeast research farm suggesting that the impact on yield was insignificant. Therefore, results from SERF are not presented. At Volga and NERF, crown rust occurred when the crop was at about flag leaf. As a result, IDM and flag leaf applications were carried out either on the same day or within a couple of days apart. Generally, crown rust incidence and severity were moderate with slightly higher intensities at Volga than at NERF. Both the fungicide and cultivar were significant in reducing crown rust severity with the resistant cultivar registering the lowest crown rust severity while flag leaf and IDM timings had generally better disease suppressions and higher grain yield.

The sorghum trial had low disease pressure due to unfavorable weather conditions and this led to lack of statistically significant differences among treatments. Considering that the area has very few sorghum fields, it is possible that natural inoculum for sorghum diseases is consequently low. Nevertheless, if fungicides are to be used, growers are reminded to scout and apply the appropriate product, using the recommended application rate to effectively manage grain sorghum foliar diseases.

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OAT

1.0 Crown rust integrated management NERF, SERF & Volga

This study was developed to assess three strategies for managing crown rust. The three strategies included spraying Stratego 250EC (7 fl oz/A) at flag leaf (FL), after heading (AH, within 4 days after heading) or after scouting the field, also referred to as an integrated disease management (IDM) approach as well as an untreated control. Four oat cultivars with varying levels of crown rust resistance; Deon, Hayden, Horsepower and Souris were used to evaluate the efficacy of these different approaches to control crown rust at NERF, SERF and Volga.

The study was laid out as a randomized complete block design (RCBD) with a split plot arrangement with cultivars as the main plots and treatments as subplots. Each block was replicated four times at each location.

Although crown rust prevalence was low at Northeast research farm, susceptible and moderately resistant cultivars had significant disease development (Table 1.1). At both locations, fungicide application significantly reduced disease and prevented yield loss. The after heading timing was the least impactful timing, while the IDM had the greatest response. The yield versus crown rust association analysis revealed a statistically significant relationship, r = -0.57, p<.0001 while that of *Helminthosporium* leaf spot versus yield was r = -0.39, p=0.001 suggesting that much of the variation in yield attributable to foliar diseases was mainly caused by crown rust than *Helminthosporium* leaf spot.

The Volga location experienced a relatively higher crown rust pressure than NERF. The yield versus crown rust association was r = -0.68, p<.0001 where significant yield differences were observed (Table 1.2). Apart from crown rust, *Helminthosporium* leaf spot also occurred at Volga, with an association coefficient, r = -0.60, p<.0001.

The results in Tables 1.1 and 1.2 demonstrate the importance of cultivar selection, IDM and emphasize the concept that there is no single disease management strategy that works across the board as conditions differ from season to season, location to location.

Cultivars: Deon, Hayden, Horsepower, Souris

Previous Crop: Corn

Planted: 05/22/2018 (NERF), 04/27/2018 (SERF) and 05/17/2018 (Volga)

Table 1.1. Crown Rust Integrated Management: Efficacy of Stratego 250 EC @ 7.0 fl oz/ac applied at different oat growth stages for crown rust management at Northeast research farm near South Shore, SD.

Cultivar	Timing†	Yield (bu/ac)		Test weight (lb/bu)		Crown rust (%)	
Deon	AH	117.53	abc	38.68	cd	0.00	d
Deon	FL	120.01	ab	39.72	bcd	0.00	d
Deon	IDM	118.85	abc	39.24	bcd	0.00	d
Deon	Untreated	116.72	abcd	39.51	bcd	0.00	d
Hayden	AH	117.90	abc	41.70	a	0.80	d
Hayden	FL	119.47	abc	40.56	ab	2.38	d
Hayden	IDM	129.12	a	41.67	a	0.25	d
Hayden	Untreated	100.98	de	40.14	bc	4.78	cd
Horsepower	AH	92.22	ef	39.85	bcd	12.90	a
Horsepower	FL	118.70	abc	40.09	bcd	2.38	d
Horsepower	IDM	128.56	a	39.57	bcd	2.93	cd
Horsepower	Untreated	79.02	f	38.75	cd	26.18	a
Souris	AH	103.49	cde	39.33	bcd	1.58	d
Souris	FL	119.04	abc	39.51	bcd	3.10	cd
Souris	IDM	108.94	bcd	39.65	bcd	2.53	d
Souris	Untreated	79.55	f	38.57	b	10.43	bc

Means followed by the same letter are not significantly different, p≤0.05

†AH = after heading, FL = flag leaf, IDM = integrated disease management

Table 1.2. Crown Rust Integrated Management: Efficacy of Stratego 250 EC @ 7.0 fl oz/ac applied at different oat growth stages for crown rust management at Volga research farm, SD.

Cultivar	Timing	Yield (bu/ac)		Test weight (lb/bu)		Crown rust (%)	
Deon	AH	130.26	a	35.77	b	1.42	d
Deon	FL	124.89	a	35.92	b	0.25	d
Deon	IPM	131.19	a	36.26	ab	0.00	d
Deon	Untreated	118.06	ab	35.78	b	1.25	d
Hayden	AH	95.75	abcd	36.97	ab	6.08	cd
Hayden	FL	100.41	abcd	36.52	ab	0.25	d
Hayden	IPM	114.02	abc	36.70	ab	2.00	d
Hayden	Untreated	90.44	abcd	37.43	ab	4.06	d
Horsepower	AH	62.98	de	40.28	a	27.88	ab
Horsepower	FL	99.60	abcd	36.07	ab	10.44	cd
Horsepower	IPM	111.46	abc	36.17	ab	5.25	d
Horsepower	Untreated	44.43	e	36.25	ab	40.56	a
Souris	AH	79.23	bcde	37.72	ab	19.94	bc
Souris	FL	108.75	abc	36.52	ab	9.50	cd
Souris	IPM	122.89	a	39.81	ab	7.94	cd
Souris	Untreated	73.52	cde	38.51	ab	25.94	b

Means followed by the same letter are not significantly different, p≤0.05

†AH = after heading, FL = flag leaf, IDM = integrated disease management

SORGHUM

2.0 Sorghum foliar disease management Volga

Grain sorghum was used to evaluate the efficacy of two rates of Nexicor fungicide (5fl oz/ac and 7fl oz/ac) applied at heading growth stage at Volga. The trial was set up as an RCBD with 6 blocks/replicates. Results showed slightly reduced yield and increased disease severity in untreated plots (Table 2.1). The yield difference was not statistically significant between the two Nexicor rates.

Hybrid: Commercial (name not provided)

Previous Crop: Sorghum

Planted: 05/08/2018

Table 2.1. Effect of different rates of Nexicor for managing foliar fungal diseases of Sorghum, Volga SD

Treatment	Yield (bu/ac)	Test weight (lb/bu)	Leaf spot (%)	Bacterial leaf streak (%)
Untreated Check	82.63 a	59.53 a	1.47 a	1.2333 a
Nexicor, 7fl oz/ac	92.34 a	59.73 a	0.42 a	0.1833 a
Nexicor, 5fl oz/ac	97.07 a	59.99 a	0.72 a	0.8333 a

Means followed by the same letter are not significantly different, p≤0.05