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FUNGICIDE SEED DRESSINGS COMPARED FOR CONTROL OF LOOSE SMUT AND THEIR IMPACT ON YIELD OF OATS

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Introduction - Loose smut, which is caused by the fungus *Ustilago avenae*, disease wherever oats is grown for grain. Occurrence of this disease is in 'bin run' seed of a smut-susceptible oat variety that has not been treated seed dressing. Yield loss to loose smut is directly proportional to the diseased seed heads. While losses generally range from 2 to 25%, yield 80% have been associated with severe loose smut outbreaks in oats. While loose smut on the yield of oats in Alabama or its surrounding states has determined, this disease is often seen in Alabama oats. A covered smut of caused by the fungus *Ustilago kollerii*, may be confused with loose smut and loss. Loose and covered smuts have no impact on the biomass yield of oat cover or forage.



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Resistant varieties and seed dressings are the commonly mentioned controls for loose smut of oats. While resistance to loose smut is reported in some oat breeding lines, the reaction of commonly grown commercial oat varieties to this disease is unknown. As a result, smut resistant oat varieties are not a viable control option for Alabama farmers. Loose smut can be controlled with seed dressings that contain a systemic fungicide like carboxin, difenoconazole, or tebuconazole. Seed dressings that contain the contact fungicides thiram or mancozeb cannot kill the causal fungus once it has colonized the seed and thereby give relatively poor loose smut control. The objective of this study was to evaluate the effectiveness of several registered and experimental machine-applied fungicide seed dressings for the control of loose smut and their impact on the yield of oats.

Materials and Methods - Seed of 'Coker 227' oats was cleaned, treated with the fungicide seed dressings listed in Table 1, bagged, and stored. Before planting, 363 lb/A of 5-27-26 fertilizer with 10 lb/A sulfur (20-100-60-10S) was broadcast on 19 September 2008 and incorporated with a disk harrow. Seed were sown with a grain drill on 21 November 2008 in a Malbis fine sandy loam (OM<1%) at the Gulf Coast Research and Extension Center in Fairhope, AL. On 9 February 2009, 235 lb/A of ammonium nitrate (80-0-0) was broadcast. The experimental design was a randomized complete block with 4 replications. Individual plots were 4 ft wide by 25 ft in length. Post-emergent weed control was obtained with a broadcast application of a tank mixture of 0.4 oz/A of Harmony DF + 12 fl oz/A of Weedar 64 on 23 January 2009. To control oat crown rust, applications of Tilt 3.6E at 4 fl oz/A, which were made on 19 March and 30 March 2009, were followed by an application of Tilt 3.6E at 4 fl oz/A + Headline 2.09E at 6 fl oz/A on 9 April 2009. Foliar fungicides applications were made with a CO₂ back-pack sprayer with four TX-12 nozzles spaced 18 inches apart at 40 psi in 15 gal/A of spray volume. Stand counts were made on 8 January 2009. Loose smut incidence was visually rated on 9 April 2009 at soft dough on a 1 to 11 scale where 1 = no smutted heads, 2 = 1 to 10% of heads smutted, 3 = 11 to 20% of heads smutted to 11 = 100% of heads smutted. Plots were harvested with a plot combine.

Results – Stand counts for the Gaucho XT-treated oat seed were significantly lower compared with the non-treated controls and other fungicide seed dressings expect for Proceed MD with CTD (Table 1). The Raxil MD-treated seed had a higher stand count than Proceed MD with CTD and Gaucho XT but not the non-treated control. Highest loose smut ratings, which ranged from about 13% to 16% smutted heads, were recorded for the non-treated controls. All fungicide seed dressing treatments were equally effective in preventing the occurrence of loose smut on oats. Effectiveness of the fungicide seed dressings in preventing loose smut were reflected in significantly higher yields when compared with the non-treated controls. Yield gains of approximately 46 to 57 bu/A were obtained with the fungicide seed dressings.

Table 1. Impact of fungicide seed dressings on stand count, loose smut incidence, and the yield of ‘Coker 227’ oats.

Fungicide Seed Dressing	Rate 100 lb seed	Stand Count # plants/row foot	Loose Smut Rating*	Yield bu/A
Non-treated Control	--	12.0 ab**	2.3 a	79.3 b
Raxil MD	5 fl oz	13.5 a	1.0 b	125.8 a
Proceed MD with CTD	5 fl oz	10.0 bc	1.0 b	136.4 a
Gaucho XT	3.4 fl oz	9.0 c	1.0 b	130.3 a
Proceed MD Alternative	5 fl oz	11.8 ab	1.0 b	131.1 a
Non-treated Control	--	12.3 ab	2.6 a	79.6 b

*Loose smut incidence was rated on a 1 to 11 scale where 1 = no disease, 2 = 1 to 10, 3 = 11 to 20%, to 11 = 100% of heads smutted.

**Numbers in each column that are followed by the same letter are not significantly different according to the least significant difference (LSD) test (P=0.05).

Summary – The fungicide seed dressings tested in this study proved highly effective in preventing loose smut in oats. The sizable 37% to 42% yield gains, which translates into an additional 46 to 57 bu/A, obtained with these treatments indicates that loose smut incidence in the non-treated controls may have been considerably higher than the visually estimated 13% to 16%. Of the fungicide seed dressings evaluated, Raxil MD and Gaucho XT are available as a machine-applied product for use on oats and other small grains from seed dealers in Alabama and surrounding states. Gaucho XT, which contains two fungicides and the insecticide imidacloprid, should provide some early season aphid control as well. Both of the Proceed MD formulations are experimental products and proved as effective as Raxil MD and Gaucho XT. Other fungicide seed dressings that have good activity against loose smut include machine-applied formulations of Dividend and planter box products with the systemic fungicide carboxin that are sold under other trade names.