EVALUATION AND COST ANALYSIS OF ALTERNATIVE RESIDUE MANAGEMENT METHODS FOR KENTUCKY BLUEGRASS SEED PRODUCTION IN THE GRANDE RONDE VALLEY

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Introduction

The production of high quality grass seed is important to the agricultural economy of the Grande Ronde Valley (GRV) of eastern Oregon. The predominate grass seed crops grown in the area are Kentucky bluegrass and fine fescues. Historically, open-field burning has been an effective, economical means by which to remove residue and maintain seed yield and quality. The continued concern for air quality and public health have led to the adoption of alternative residue management methods that place less reliance on open-field burning of full straw residue loads.

Past research conducted in Oregon identified potential alternative residue management strategies that maintain seed yield and quality in the absence of open field burning (Chastain et al. 1997, Chastain et al. 2000). Although not included in previous research efforts in the GRV, mechanical removal of residue followed by propane-flaming of stubble has been widely adopted in the GRV as one alternative to open-field burning. In 2001, residue management efforts in the GRV utilized propane-flaming on 46% of the total harvested grass seed acreage.

Recently, a need was identified to conduct further research on alternative residue management methods currently used for Kentucky bluegrass seed production in the GRV. A large, on-farm study was established in 2001 to address the following objectives: 1) determine the effect of alternative residue management methods on seed yield and quality of Kentucky bluegrass; 2) conduct a cost-analysis of non-thermal and propane-flaming residue management methods over a period of three seed crop years; and 3) develop educational programs for dissemination of information obtained from this study to producers and the agricultural industry.

Materials and Methods

The study was established in the summer of 2001 in a commercial Kentucky bluegrass (var. 'Kelly') seed production field in the GRV. The experimental design of the study consisted of 4 residue management treatments arranged in a randomized complete block with 3 replications. Residue management treatments consisted of: 1) bale only; 2) bale + flail; 3) bale + propane early; and 4) bale + propane late. Individual plots are 25 ft by 400 ft. Production practices (e.g., fertilizer and chemical application) for the study site were managed by the cooperating producer according to common commercial production practices utilized in the GRV.

Commercial production-sized equipment were used to make ag-chemical applications and to harvest the seed crop. Data collection consists of clean seed yield, purity, and germination. A weigh wagon was used to measure bulk seed harvested from each plot. Sub-samples were collected during harvest to determine clean seed yield and quality.

Residue management treatments were initiated in the summer of 2001 following the first commercial seed harvest. Bale only, bale + flail, and bale + propane early treatments were applied on August 8-9, 2001. The bale + propane late treatment was applied on September 12, 2001 to Kentucky bluegrass with approximately 2-3 inches of vegetative re-growth. Individual plots were swathed with a commercial-size swather on July 10, 2002 and were harvested with a commercial-size combine on July 26, 2002. Sub-samples collected during the 2002 seed crop harvest were processed during the fall of 2002 by cleaning one time with a Clipper M2-B Cleaner with three screens. Clean seed samples were subjected to germination and purity analysis at the OSU Seed Laboratory. Post-harvest residue management treatments including bale only and bale + flail were applied on August 5, 2002. The bale + propane early treatment was applied on August 7, 2002 and the propane late treatment was applied on September 3, 2002.

Results and Discussion

Results from the first seed harvest following application of residue management treatments are shown in Table 1. Seed yields were significantly reduced when residue was baled off and stubble was left intact (bale only) when compared to baling followed by late thermal treatment. A slight increase in seed yield was observed when baling was followed by flailing or early thermal treatment of the remaining stubble, however, these yields were not significantly different. Early and late thermal reduction of stubble resulted in equivalent seed yields. Although the results indicate that mechanical residue removal followed by late thermal treatment produced greater seed yields than any other treatment, it is unclear at this time if the yield increase is a varietal response due to late thermal treatment. Seed purity and germination levels were not influenced by mechanical or thermal residue management methods.

Results from the first year of this study indicate that the amount of residue and stubble remaining in the field after harvest affect seed yield and are similar to previously reported results. The study will continue for two additional seed crop harvests to determine if locally adopted residue management methods will maintain seed yield and quality. An economic

analysis will be conducted at the completion of the study to determine economic return from each of the residue management methods.

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Table 1. Residue management influence on seed yield and quality in Kelly Kentucky bluegrass, 2002.

Treatment	Seed yield	Purity		Germination
		Pure Seed	Inert	
	(lb/acre)	(%)		
Bale only	1087 b[1]	96.1	3.9	91.0
Bale + Flail	1236 ab	97.0	3.0	94.3
Bale + Propane Early	1256 ab	96.8	3.2	93.0
Bale + Propane Late	1416 a	98.1	1.9	93.3
LSD 0.05	257	NS[2]	NS	NS

[1] Means in columns followed by the same letter are not significantly different by Tukey's mean pairwise comparison test.
[2] N.S. = not significant.