POST-HARVEST RESIDUE MANAGEMENT OF KENTUCKY BLUEGRASS FOR SEED PRODUCTION IN CENTRAL OREGON

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ABSTRACT

Fourth year (1984) seed yields were obtained from Merit, Baron, Parade, America, Mystic, and Rugby Kentucky bluegrass varieties that had been subjected to eight residue removal schemes in August 1983. This is part of the 1984 data from a study initiated in the fall of 1980 to determine the effect that different regrowth drying/removal techniques might have on the subsequent year's seed production. Total rainfall of 1.9 inches from the 1983 seed harvest to August 1 obliterated the seed yield advantage from early open-field burning (OFB) generally observed because plots for this treatment had regrowth which did not exist in prior years of this study. Therefore, all varieties were similar in yield after OFB and Treatment 7 (straw fluffed up out of regrowth, OFB, and residue clean-up with a propane field burner). Paraquat was a more effective dessicant for regrowth than Contact (Dinitro-) so OFB removed residue satisfactorily which eliminated the need to use the propane field burner. Parade, America and Rugby appear to have a greater tolerance to regrowth drying and removal by burning than the others. All varieties studied do not respond the same to each management method.

The production of Kentucky bluegrass (Poa pratensis L.) seed has been an important enterprise in Central Oregon for many years. Growers have recognized the necessity of removing the postharvest residue for maintenance of maximum seed productivity throughout the life of the stand. The most economical and effective technique has been the use of open field burning during the last of August and the first week of September. From none to various amounts of straw have been burned on different fields depending, in many cases, upon the market price of bluegrass straw for hay. In years when field soil moisture is low and no or very little rainfall is received, the bluegrass residue can be burned quite effectively. However, if for various reasons the bluegrass plants remain green through harvest or initiate regrowth after combining, the growers are

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confronted with the problem of drying the regrowth or the straw if rainfall occurs. Several methods have been and are presently used to prepare the residue for either open-field or machine burning with varying degrees of success. Therefore, a study was initiated in 1980 to evaluate the effect of clipping, dessicants, open-field burning and different machine burning temperatures on seed yield and its components for a four-year period.

MATERIAL AND METHODS

A field with soil classified as a fine-loamy, mixed, mesic Aridic Agrixerolls at the Madras research site of the Central Oregon Experiment Station was selected. The land was clean cultivated during the summer of 1980 and planted September 3 and 4, 1980, with Merit, Baron, Parade, America, Mystic, and Rugby Kentucky bluegrass at about three pounds per acre. Each variety was planted with Planet Jr. units equipped with double disk openers in rows 12 inches apart with 12 rows wide (12 feet) per variety across the field in strips that were replicated randomly four times. The following eight residue management treatments were imposed on each variety:

Trt. No.	Treatment Description
1	Residue Open-Field Burned (OFB), control
2	Regrowth machine burned at high temperature, 800-900°F (HT-MB)
3	Regrowth machine burned at medium temperature, 500-600°F (MT-MB)
4	Regrowth machine burned at low temperature, 300-400°F (LT-MB)
5	Regrowth dried with Paraquat, OFB (Par-OFB)
6	Regrowth dried with Contact (Dinitro-), OFB, Propane Burned (Con-OFB-PF)
7	Straw fluffed-up from regrowth, OFB, PF (St-OFB-PF)
8	Regrowth clipped, OFB, PF (Clip-OFB-PF)

The experimental design was a split plot with the management treatments as whole plots (80 feet x 30 feet) and varieties as sub plots (12 feet x 30 feet). There were four replications. All treatments were imposed after each seed harvest in 1981, 1982, 1983, and 1984. The dates of each treatment each year varied because of weather, plant, soil, residue conditions, etc. Only dates and conditions of 1983 treatments are given since only 1984 results are presented. Prior year treatments undoubtedly had some effect on the 1984 results but these will be reported later.

Treatment 1 was burned by lighting the periphery of each plot with a propane torch on August 16. Approximately 25% additional straw from nearby plots not needing straw was placed on all plots receiving Treatments 1 and 7 to obtain field burns

comparable to large fields. Straw was baled and removed from the other plots. There was a stubble height of about three inches on all plots after swathing at seed harvest.

There was 1.9 inches of rain after seed harvest, sufficient to promote development of regrowth. About four inches of regrowth occurred on all plots to receive Treatments 2-6 and 8. Plots for Treatment 7, which had a straw load similar to those for Treatment 1 had from 6-8 inches of regrowth. Treatment 2 was burned on August 16 and Treatments 3 and 4 were burned on August 17.

The machine burns (Treatments 2, 3, 4) were done with the research plot sanitizer constructed for and used by Dr. C.L. Canode at Washington State University in his research program (1). The temperature was regulated by pressure from two-120 gallon propane tanks. The sanitizer was operated at 28-32, 18-22 and 8-10 psi for the high, medium and low temperature burns with a ground speed of 1.3 mph. Temperatures were measured by temperature sensitive paint spots on 3 x 3 inch 20 gauge aluminum pieces placed with the paint spots down on the soil surface. A thermocouple with 20-guage type K chromel-alumel wire was also used to set machine temperatures and to obtain burn temperatures within the plots. The thermocouple junction was placed at the soil surface between the rows of grass. Residue was placed over the junction to represent conditions of the test plot as nearly as possible.

Wide fluctuations in temperature readings with both the paint plates and thermocouple were observed. Treatment 5 and 6 plots were sprayed on August 9 and OFB on August 15. The amount of residue after OFB on treatment 6 was too great so it was cleaned-up with a propane field burner at 1.3 mph ground speed. Paraquat at 1 qt/A with 1 qt/A X-77 Spreader and Contact at 2 qt/A with 1.5 qt/A Mor-Act were each applied with 25 gallons water/A.

The straw on Treatment 7 plots was pulled-up out of the regrowth and fluffed with a British Lely Pheasant 80 drum tedder on August 12. This machine did a superb job compared with a side-delivery rake with hand spreading and a 'Kuhn' tedder with contra-rotating rakewheels used in previous years. These plots were OFB on August 16. The regrowth on plots for treatment 8 was clipped on August 9 as close to the soil surface as possible (about two inches) with a Taarup disc mower conditioner without the swathing deflectors. This machine was superior to the rotary blade mower used in a previous year. These plots were OFB August 15 but there was insufficient amount of residue to carry the fire for a uniform burn. Therefore, the propane field burner was used on August 18 to clean up the plots.

All plots were irrigated after all treatments were completed as needed. All plots were harrowed after residue removal to

disperse the ash before application of 3 lb/A Banvel on September 2 to control rattail fescue. The whole experimental area was fertilized with 25-10-0 split about 50/50 between fall and spring application to give about 200 lb N/A for the year. An application of .5 + .25 lb/A of 2,4-D and Banvel were applied in the spring of 1984 to control broadleaf weeds.

Seed harvest occurred July 18 and 19. An area 3.3 feet wide x 18 feet long from each plot was cut by machine in the early morning when dew prevented seed shatter and placed in a cotton bag to air dry. All seed was threshed with a stationary thresher, delinted, scalped, and cleaned with a M-2B air screen machine. Seed weights per plot were used to calculate seed yield/A. Other samples were collected for seed yield components but these results will be reported later. This report presents only information and seed yields pertaining to the 1983-84 crop year.

Results were analyzed statistically. Duncan's multiple range test at the .05 level of probability was used to test for significant differences among treatments.

RESULTS AND DISCUSSION

There were several irregularly shaped spots where plant crown regions had been burned out in plots of Treatment 1 (OFB) and Treatment 7. High temperatures from burning the straw were attained in spite of the regrowth. Regrowth was similar on plots of these two treatments because of the late July rains so the completely dry plots for OFB control were not obtained. The main differences between the two treatments were the pulling and fluffing of the straw out of the regrowth and the cleaning up of all residue with the propane field burner for Treatment 7. Because of these conditions, the seed yields of cultivars subjected to Treatment 7 were similar for each cultivar except Baron (Table 1). Generally, OFB was the superior residue removal method in previous years.

No observable differences in time and amount of regrowth among cultivars within each management scheme were noted.

Seed Yield Comparisons Among Management Treatment Means. The fourth year (1984) average seed yields of all varieties following OFB and Treatment 7 were similar, 655 and 625 lb/A, respectively (Table 1). These were the best treatments. Few differences existed among other management techniques. The use of Paraquat had no adverse affect on seed yield for any cultivar compared to Dinitro- or Contact (Treatment 6). Paraquat was more effective in drying the regrowth than Contact. There was too much green plant material in all of the Contact treated plots for a satisfactory removal by OFB which necessitated the use of a propane field burner for clean up.

Seed Yield Comparisons Among Variety Means. Parade, America, and Rugby were similarly the highest seed yielders considering the effect of all management practices. Mystic was the lowest seed producer and Merit and Baron, which were similar, averaged 488 and 472 lb/A over all treatments.

Differential Seed Yield Responses of Varieties to Management. Merit, Parade and Rugby each yielded a similar amount of seed after OFB and Treatment 7 but the seed yield of Baron was higher from OFB than from Treatment 7. In terms of seed yield, it made no difference for America whether residue was removed by OFB or the regrowth dried with Paraquat, Contact or straw fluffed up and a clean up by propane burning. This variety appeared to be more tolerant of different residue removal methods than the other cultivars tested.

A seed grower probably does not need to be too concerned about maintaining the maximum seed yield on any variety as long as the residue can be OFB. However, if regrowth occurs, the grower may not get the same seed yield the subsequent year after various practices to dry and remove the residue.

Reference

(1) Canode, C.L. and A.G. Law. 1977. Post-harvest residue management in Kentucky bluegrass seed production. Washington State University College of Agriculture Research Center Bulletin 850.

Table 1. Fourth year seed yield of Merit, Baron, Parade, America, Mystic, and Rugby Kentucky bluegrass after eight different residue management treatments, Madras, Oregon, 1984

Mgt. Trt.	Merit	Baron	Parade	America	Mystic	Rugby	Mgt. Trt. Mean
1. OFB	694 a[2]	721 a	760 a	663 a	325 a	766 a	655 a
	a[3]	a	a	a	b	a	
2. HT-MB	369 c	352 c	438 b	459 bc	25 a	449 b	349 c
	a	a	a	a	b	a	
3. MT-MB	463 bc	379 bc	453 b	483 bc	41 b	557 b	396 bc
	ab	b	ab	ab	c	a	
4. LT-MB	377 c	450 bc	462 b	425 c	42 b	562 b	386 bc
	b	ab	ab	ab	c	a	
5. Par-OFB	464 bc	452 bc	574 b	691 a	189 ab	489 b	477 b
	b	b	ab	a	c	b	
6. Con-OFB-PF[1]	481 bc	380 bc	569 b	619 ab	43 b	607 b	450 b
	ab	b	a	a	c	a	
7. St-OFB-PF	615 ab	534 b	832 a	726 a	279 a	764 a	625 a
	bc	c	a	ab	d	a	
8. Clip-OFB-PF	439 c	509 bc	593 b	486 bc	92 b	511 b	438 bc
	b	ab	a	ab	c	ab	
Cultivar Mean	488	472	585	569	129	588	
	b	b	a	a	c	a	

1 PF = Remainder of residue removed with propane field burner.

2 Values among mgt. trts. within a variety (column) with different letters beside the value are significantly different at the .05 level of probability using Duncan's Multiple range test.

3 Values among varieties within a mgt. trt. (row) with different letters below the value are significantly different at the .05 level of probability using Duncan's Multiple range test.