

Sudangrass greenchop yields reduced by wheel damage during harvesting



Typical wheel pattern showing extent of coverage left upon the stubble by greenchop equipment.

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GREENCHOPPING FORAGE requires the frequent use of heavy equipment including tractors, choppers, and bank-out wagons—operating in fields that may vary from rather dry to quite wet. Such equipment may weigh from 16,000 lbs empty to nearly 25,000 lbs loaded, and this weight is unequally distributed among many wheels. The width of cut of the chopper, the axle widths of all units, and the positions of hitches determine the area of stubble run over by the wheels in successive rounds during field harvesting. Tests with typical greenchop equipment indicated that up to 80 per cent of the ground area was run over by wheels. Some wheels exactly track the preceding wheels and others partially cover areas run over in previous harvest rounds—thus there is no uniform wheel load treatment applied to the crop stubble or ground surface.

Trials were conducted through three harvest years to determine if the equipment used in the process of greenchopping had any effect upon yield and if so, to what extent. Two sudangrass cultivars were used, one representing a sudangrass and the other a sorghum × sudangrass, with four treatments and six replications, harvested four times per season. Treatments consisted of running over the freshly cut stubble with half-full greenchop equipment, as follows: (1) control, no treatment applied; (2) treated after the first harvest of the season only; (3) treated after the first and second harvests only, and (4) treated after first, second, and third harvests. The photo illustrates a part of the 1967 trial plantings showing

the typical wheel pattern left upon stubble after being run over by greenchop equipment. The first- and third-year trials were planted in 18-inch rows and the second-year trial in 6-inch rows. The center two rows of each plot were cut for yield. As nearly as possible the plots were harvested throughout the season when the control plots attained a height of 30 to 35 inches.

The table shows the amount of yield reduction due to the treatments. Differences between treatment means and the control are all statistically significant at the five per cent level. Although differences in yield between cultivars due to any given treatment are not statistically significant, the results do suggest that the sorghum × sudangrass cultivar sustained a greater reduction in yield than the sudangrass.

Observations over the three trial years suggested that yield reduction was primarily caused by damage to the stand

resulting from crushing of the plant crowns and possibly from soil compaction. The degree of damage appeared to increase with high soil moisture content at the time of treatment. There was some indication that increased growth of plants immediately adjacent to the equipment tracks partially compensated for the growth reduction in the track area.

Future investigations may suggest adjustments or design alterations in greenchop equipment, and row spacings of the crop to minimize this damage. At present, however, timing irrigations to leave the ground surface as dry as possible at the time of harvest—without subjecting the stand to undue stress—will help minimize compaction.

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TOTAL SEASONAL DRY-MATTER YIELD OF TREATMENTS IN TONS PER ACRE AND REDUCTION IN YIELD AS PER CENT OF THE CONTROL WHEN GREENCHOP EQUIPMENT WAS RUN OVER FRESH STUBBLE AT ONE OR MORE HARVEST DATES (THREE-YEAR AVERAGE)

Crop	Treatment 1		Treatment 2		Treatment 3		Treatment 4	
	Control	Run over once only/season		Run over after 1st and 2nd harvests only		Run over after 1st, 2nd, and 3rd harvests		
	Yield	Yield	Reduction	Yield	Reduction	Yield	Reduction	
Sudangrass	T/A	T/A	%	T/A	%	T/A	%	
Sorghum × Sudangrass	7.43	6.99	6.0	6.72	9.6	6.56	11.7	
Treatment mean	7.47	6.86	8.2	6.40	14.3	5.85	21.7	
LSD (.05)	7.45	6.92*	7.1	6.52**	11.9	6.20**	16.7	
(.01)	0.43							
C.V.	0.61							
	5.0							

* Significant at 5 per cent.
** Significant at 1 per cent.