Forage Research in Texas

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Department of Soil and Crop Sciences

PW - 0080

Project: H 1723

Worker: E. C. Holt

Location: College Station

SWITCHGRASS MANAGEMENT

OBJECTIVE:

To determine the influence of defoliation practices on stand survival, vigor and yield of switchgrass.

PROCEDURE:

Three Soil Conservation Service switchgrass accessions (PMT 279, PMT 785, PMT 788) were established by seeding in 1 m width rows in the spring of 1973. Defoliation treatments were initiated in the spring of 1974 as follows: cut at 3 and 6 weeks intervals and cut to stubble heights of 15 and 37 cm in all combinations. Individual plots were 3 rows, 6 m long. The center row was harvested for yield; 4 replications. Yield and percentage of growing points removed were determined at each cutting in 1974, 1975, 1976, 1977. Yields only were determined in 1978. Tiller counts were made one or two times each growing season through 1979 to determine the influence of defoliation on stand density. Cutting treatments were continued through 1979 (6 years) but only tiller counts were made in 1979.

RESULTS:

Yield data for 1978 are shown in Table 1. Approximately 75% of 1978 production was prior to May 25. Regrowth in general was poor. Regrowth on plots scheduled for 3-week harvest was inadequate for harvesting on August 1. An accumulated effect of harvest frequency is evident at the first cutting in 1978. All plots were cut on May 25, but those previously cut at 6-week interval produced 22% more forage; total yield for the season was 24% greater with 6-week harvesting. The difference in yield due to cutting height was small, averaging on 171 kg/ha which was not significant statistically. PMT 788 and PMT 785 produced more forage than PMT 279.

PMT 788, which was released as 'Alamo' switchgrass in 1979, had 28% and 58% more tillers than PMT 279 and PMT 785 respectively (Table 2). There was a tendency for more tillers to develop with 15 cm stubble height than a 37 cm stubble height with frequent harvest, but this tendency was not apparent with less freqeunt harvesting (6 weeks). When averaged across all other treatment variables, (main treatment effects), neither cutting height nor cutting frequency influenced tiller number.

PMT 785 tended to develop more lateral branches per tiller than either PMT 279 or PMT 788. There was an even stronger tendency for more lateral branching with tall stubble. However, lateral branching was not extensive, there being less than one branch per tiller in all instances.

Accumulative effects for the 6-year period are shown in Table 3. There was a general decrease in tiller numbers over time for all accessions and defoliation treatments through 1977. Considerable recovery was recorded in 1979. The reason for the increase in tiller numbers in 1979 is not readily apparent. PMT 788 maintained greater tiller density throughout the study and showed slightly less percentage reduction in tiller numbers than either PMT 279 or PMT 785. These data do not indicate that mechanical defoliation practices within the range of practices employed in this study, have any major impact on stand maintenance. Regrowth was made from the first intact node below the cutting height. New shoot growth from an axillary bud assured the survival of that tiller. Apparently three weeks, the most frequent defoliation employed in this study, was adequate time for an axillary bud to form on an arial shoot that developed from a previous axillary bud. This process was apparently repeated with each defoliation thereby providing for the survival of a high percentage of tillers initiated at the beginning of the growing season.

Table 1. The influence of cutting management on yield of Switchgrass genotypes, 1978.

Harvest Frequency (Weeks)	Cutting Height (cm)	Accession	Kg/ha; Dry Matter May 25	June 16	July 11	Aug 1	Aug.21	Total
3	15	PMT 279	2780	306	112	-	70	3268
3	15	PMT 785	3351	421	112	-	150	4034
3	15	PMT 788	4399	517	176	-	125	5217
		Average	3510	414	133	-	86	4143
3	37.5	PMT 279	2811	628	88	-	88	3615
3	37.5	PMT 785	3354	1024	146	-	189	4713
3	37.5	PMT 788	3688	405	141	-	158	4392
		Average	3284	686	125	-	145	4240
		Frequency Average	3397	550	129	-	116	4192
6	15	PMT 279	3971		568		139	4678
6	15	PMT 785	4952		732		148	5832
6	15	PMT 788	5230		805		176	6211
		Average	4718		702		154	5574
6	37.5	PMT 279	3356		947		267	4370
6	37.5	PMT 785	3409		1482		233	5124
6	37.5	PMT 788	3894		637		366	4897
		Average	3553		1022		289	4864
		Frequency Average	4136		862		221	5219
Averages Height -	15		4114	414	418		120	5066
	37.5		3418	686	574		217	4895
Accession	PMT 279		3230	467	429		141	4267
	PMT 785		3766	722	618		180	5286
	PMT 788		4303	461	440		206	5414

Table 3. Accumulated effects of defoliation treatments on switchgrass tiller density.

Main Effects	Average live tillers per 30 cm of row						
	June 1974	July 1975	Oct. 1975	June 1976	Nov. 1976	Nov. 1977	Aug. 1979
Accession							
PMT 279	176	112	119	103	92	72	148
PMT 785	161	102	115	91	100	72	120
PMT 788	204	140	158	112	143	90	190
Height of Cutting							
15 cm	175	112	140	100	116	84	155
37 cm	185	123	121	106	107	79	151
Frequency of Cutting							
3 week	201	118	132	103	106	82	155
6 week	159	118	129	101	117	81	151