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Yield and quality responses of summer annual grasses to different management regimes

Rodney J. Creel

To the Graduate Council:

I am submitting herewith a thesis written by Rodney J. Creel entitled "Yield and quality responses of summer annual grasses to different management regimes." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Plant, Soil and Environmental Sciences.

Henry A. Fribourg, Major Professor

We have read this thesis and recommend its acceptance:

John H. Reynolds, Daniel L. Coffey

Accepted for the Council:
Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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Accepted for the Council:

L Evans Roth

Vice Chancellor
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YIELD AND QUALITY RESPONSES OF SUMMER ANNUAL GRASSES TO DIFFERENT MANAGEMENT REGIMES

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Rodney J. Creel

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ABSTRACT

Sorghum-sudangrass hybrids (Sorghum bicolor (L.) Moench) and improved pearlmillets (Pennisetum americanum (L.) Leeke) produce large amounts of forage in summer when most cool season forage crops have slowed production.

To determine some plant and environment characteristics and the extent of cultivar x management interaction over a broad spectrum of managements, four summer annual grass cultivars were subjected to 19 different defoliation frequency and stubble height managements at Knoxville, Tennessee in 1976 and 1977. The cultivars were Chowmaker 235, Sweet Sioux III, FS-531 sorghum-sudangrass hybrids, and Millhy 99 pearlmillet. The plots were sidedressed with nitrogen (N) twice during the summer and two samples were taken at each harvest, one large one to determine DM production, and a smaller one for determination of leaf area, dry weights of representative parts, meristem heights, N content and in vitro dry matter digestibility (IVDMD). Predictive models were developed for yield at each harvest, regrowth per day (kg/ha/day), total N percent and IVDMD.

Quality, morphological characteristics, and quantity of DM produced varied with year, management, and cultivar. The sorghum-sudangrass hybrids outyielded the pearlmillet when harvested later than the 90-cm height, but high quality and similar yields (10 metric tons/ha) were obtained when harvested at 90 cm.

When cut at 90 cm, stubble heights of 15- or 8-cm had no effect on yields or IVDMD, and resulted in similar N content. However, a 90-cm harvest cut to 15- or 8-cm stubble before a boot or early bloom harvest resulted in greater season yields for Chowmaker than for Sweet Sioux. Generally, Chowmaker performed best when cut to 15-cm stubble, and Sweet Sioux when cut to 8-cm stubble, when the stage of growth at harvest was earlier than the boot stage.

The pre-boot, boot or early bloom harvests were delayed by a previous 90-cm harvest for all cultivars, and N content sometimes was increased. A previous 50-15 cm harvest before an early bloom or boot harvest delayed the early bloom and boot harvests of FS-531, but did not delay those of the other sorghum-sudangrass hybrids and pearlmillet. These had greater N content as a consequence of the previous cut. The first pre-boot stage harvest of Sweet Sioux following a 50-15 cm harvest also had a larger N percent than the first pre-boot harvest of plants managed 'PB-15'. Material harvested at more mature or taller stages of growth were low in total N percent but relatively high in IVDMD.

The number of days since March 1, average plant height and the number of days during regrowth all were important predictors of harvested yields, daily regrowth, total N and IVDMD. These four dependent variables were increased as the number of days during growth increased, except for the daily regrowth in the Chowmaker model. As average plant height at harvest increased, yields and daily regrowth increased, but N percent and IVDMD generally decreased. The number of days of regrowth generally increased yields and decreased all the other dependent variables.

Chowmaker plants performed best when growth before the boot stage was cut to 15-cm stubble. The performance of plants generally was related to rainfall, and many of the managements studied were suitable. Management '50-15, EB-8, 75-15' was favorable for quality and yield. Sweet Sioux plants performed best when growth was cut to 8 cm, and the dependent variables were related not only to the three independent variables listed above, but also cumulative rainfall and temperature.

The number of days of regrowth was related to all the dependent variables for FS-531. FS-531 plants yielded more than other cultivars when allowed to reach taller stages.

In addition to the number of days since March 1, the number of days for regrowth, and average plant height, leaf area of the stubble also were important in the Millhy models. This cultivar was not responsive to management.

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INTRODUCTION

Sorghum sudangrass hybrids (*Sorghum bicolor* (L) Moench) (6) and improved pearlmillets (*Pennisetum americanum* (L.) Leeke) are important in forage programs because they produce large amounts of high quality forage in summer when most cool season forage crops have slowed production. Approximately 100,000 acres are grown in Tennessee, and although this acreage is not expanding, more information is constantly needed on new cultivars and ways of managing specific cultivars. Variety trials are limited in their approach to determining superior genotypes, since usually only one or two managements are used to compare genotypes. If there exists a cultivar x management interaction, then some cultivars may be penalized when compared to others because they are studied according to only one management scheme.

The objectives of this study were to determine the extent of cultivar x management interaction over a broad spectrum of managements, to find some of the managements better suited to specific cultivars, and to evaluate some of the plant and environment characteristics which affect these cultivar x management interactions.

CHAPTER I

LITERATURE REVIEW

Sorghum x sudangrass hybrids and certain improved pearlmillets have the capability of producing high quality forage in mid-to-late summer when cool-season perennials have low production (11, 7). Dairy and some beef operations can benefit from the relatively higher yields of crude protein (CP)/ha and *in vitro* dry matter digestibility (IVDMD) obtainable from these grasses than from perennial grasses or unimproved pastures. These plants are sometimes seeded as emergency crops when other crops fail or a feed shortage exists (16).

I. PLANTING DATE

Generally, planting of sorghum soon after the last expected frost results in higher yields than later planting, especially if available soil moisture is high. Pearlmillet should be planted a week later because of its sensivity to frost and cold (12, 19). If moisture becomes limiting after planting and germination, growth will be delayed and lower yields may result (19).

II. YIELDS

Dry matter yields of summer annuals tend to be higher when cut fewer times (such as three cuts instead of four) so that the sorghum or perlmillet will grow taller and reach a more mature stage of growth (2, 4, 28). Increasing the number of harvests reduces dry matter (DM) production potential, partly because of loss of vigor and stand reduction (2, 26). Tomeu found DM percent increased in some forage sorghum cultivars from the first to the fifth harvest (26).

Many investigators have found regrowth occurs faster at higher stubble heights (16) and that regrowth generally decreases with each additional uniform cutting (7, 26, 4). In contrast, Burger et al. (4) found that no yield advantage existed when 15.2 cm stubble was used instead of 7.6 cm. Most of the growth of summer annual grasses occurs during the first six to eight weeks after planting before it is cut (19). Pearlmillet has a relatively short growing season; production of regrowth fluctuates widely, so that it is difficult to maintain a given grazing pressure (17).

III. CRUDE PROTEIN

With each progressive advance in stage of maturity, the CP content decreases (22). Overall CP levels are lower in regrowth than in the initial harvest (22, 27). The percent CP of some cultivars of sorghum and pearlmillet harvested four times/year was 2.6% higher than that of the same cultivars harvested three times/year (4). At the first cutting, the average protein levels were higher when cut at the 15.2 cm stubble height than in similar herbage cut at 7.6 cm; in later cuts, protein levels of comparable herbage cut at 7.6 cm were higher than in herbage cut at 15.2 cm (4). Wedin (1970) obtained essentially equal yields of CP with two or three harvests. Two harvests/year produced slightly higher yields than three harvests/year; however, three harvests/year had better quality in terms of CP and IVDMD, 3.6% and 2.3% higher, respectively (28).

Burger et al. (4) and Srivastava (23) have found that increasing cutting frequency increases CP. This was probably due to the shorter height at which the herbage was cut (7). Decreasing cutting frequency has been observed to decrease CP percent but increase CP yields (28).

IV. LEAVES AND LEAF AREA

Tomeu (26) claimed that leaf percentage increased from 24.3% in the first cut to 42.1% in the sixth cut. Leaf area, however, decreased with each succeeding cut.

V. TILLERING

Even though tillering is vital for regrowth in forage sorghums, little work has been published on tillering behavior. Once the initial meristem has been removed all regrowth must ensue from lateral meristems. In several studies on grain sorghum (Sorghum bicolor (L.) Moench) in Hawaii, Escalada and Plucknett (8, 9, 10) observed that early tillers originated from basal or epigeal nodes adjacent to elongated internodes. Tillers that appeared later originated from nodes adjacent to elongated internodes. The first tillers arose at least a month after seed germination. In regrowth, the time interval for tiller appearance was longer with number of regrowths; tillers appeared after one week in the first and second regrowths, but later as cuts continued. The appearance of tillers in stands with a high population of stems was delayed more than in stands of low population, and generally, the first two tillers that arose died; however, later tillers were productive (8).

Escalada and Plucknett (10) later found that, as the rate of N applied increased, tillering capacity increased for grain sorghum. Eight centimeters about the ground seemed to be the best height of cutting for attaining balance between uniform regrowth and sufficient reserves for tiller production during summer (10).

VI. *IN VITRO* DRY MATTER DIGESTIBILITY

Variations of IVDMD among cultivars seem to be inversely related to tannin and lignin content. High levels of tannin and lignin contribute to relatively low digestibilities (20, 14). Lignin content increases with aging; cellulose and hemicellulose content in forage millets follow a similar trend as lignin content, and may also contribute to lower IVDMD as maturity approaches (3). An exception, in forage sorghum, is that greater digestibilities have been observed in frosted material, possibly due to cell wall breakdown (11).

Stem IVDMD was consistently lower than leaf IVDMD by a few percentage points (11). Forage sorghum leaves harvested at early bloom were only slightly lower in IVDMD than when harvested in the vegetative state; however, stem and head materials were of lower digestibility than leaf blades (11).

In the sorghum-sudangrass cultivar, Sudax SX-11, IVDMD decreases as the plant increases in height; it also decreases as percent leaves decrease or as percent stems increase (7). In the literature, much has been discussed about harvesting frequency and quality (4, 7, 11, 14, 16, 21, 22, 26). It appears that forage harvested more frequently or forage harvested at less mature stages was higher in digestibility than more mature stages, but yield of IVDMD was maximized by fewer harvests (28).

Pearlmillet IVDMD and leafiness (percentage of plant DM contributed by the leaves) decrease as the plant ages (14, 17). Leafiness is not significantly related to leaf digestibility at any age (14). In some cultivars stem and leaf digestibilities are not directly related (14).

CHAPTER II

MATERIALS AND METHODS

Field experiments were conducted in 1976 and 1977 to study management effects on summer annual grasses. The 1976 experiment had 15 management treatments; the one in 1977 had fewer treatments.

I. 1976 EXPERIMENT

Four summer annual grass cultivars (Table I) were planted 26 April 1976 on a Sequatchie fine sandy loam (fine-loamy, siliceous, thermic Humic Hapludults) at the University of Tennessee Plant Science Farm, Knoxville. Previously the experimental area had received 68 kg P/ha and 128 kg K/ha broadcast and disked in before planting. The four cultivars were seeded in rows oriented north-south with a Planet Jr. garden drill planter. A seeding rate of 28 kg/ha was used for the three sorghum-sudangrass hybrids and a 20 kg/ha rate for the pearlmillet.

Each experimental unit (plot) measured 6.10 m x 1.38 m and consisted of three rows .46 m apart. An area 1.83 m wide was maintained free of vegetation on all sides of the plots by disking. The area between rows was hand-hoed.

Two weeks after emergence 54 kg N/ha were sidedressed as NH_4NO_3. Later, an application of 160 kg N/ha was sidedressed on 5 August.

TABLE I

MANAGEMENTS AND CULTIVARS USED

HEIGHT OR STAGE OF GROWTH AT HARVEST (Main plot treatments*)	CULTIVAR (Split plot treatments)
1 - '50-15'	1 - Chowmaker 235 (Ring Around Products)
2 - '90-15'	2 - Sweet Sioux III (Acco Seed Co.)
3 - 'PB-15'	3 - FS-531 (Acco Seed Co.)
4 - 'B-8'	4 - Millhy 99 (Ring Around Products)
5 - 'EB-8'	
6 - '50-15, 90-15'	
7 - '50-15, 90-15, 50-15, 50-15, 75-15'	
8 - '90-15, PB-15'	
9 - '50-15, PB-15, 50-15, 75-15'	
10 - '50-15, B-8'	
11 - '50-15, B-8, 75-15'	
12 - '50-15, 50-15, B-8, 75-15'	
13 - '50-15, EB-8, 75-15'	
14 - '50-15, EB-8, PB-15'	
15 - '50-15, EB-8, B-8'	
16 - '90-8'	
17 - '90-8, PB-15'	
18 - '90-8, B-8'	
19 - '90-15, B-8'	

*The numbers refer to height at harvest (50 or 90 cm) or to stubble height (8 or 15 cm). Maturity stages at harvest were PB (pre-boot stage just before boot stage), B (boot stage), or EB (early bloom, 10% in bloom). The last management listed within quotes was continued until frost.

A split-plot factorial treatment arrangement in a randomized complete block with four replications was employed. In 1976, the main plot treatments consisted of the first 15 managements in Table I designed to simulate grazing, greenchop, hay, or silage harvests, used singly or in various combinations. Split-plot treatments were the four cultivars.

A garden tractor fitted with a sickle-bar mower was used to cut guard rows at the 15-cm height when required. If an 8-cm stubble height was desired, the plot was harvested with hand sickles using a guide bar to insure proper height.

II. 1977 EXPERIMENT

The same cultivars as in 1976 were planted on 28 April 1977 on the field used the previous year.

Prior to planting, any plant residues remaining over the winter were burned and 49 kg P/ha and 53 kg K/ha were disked into the soil. On 27 May 292 kg N/ha as NH_4NO_3 were sidedressed. This application was followed by 47 kg N/ha on 9 August.

Four rows were planted .46 m apart, with 3.5 m allowed between adjacent plots and 9.1 m alleyways at each end. The plot size was 9.1 m x 1.84 m. Guard rows were planted around the entire field experiment.

The number of split plot treatments (cultivars) allocated to each main treatment differed from 1976. Main treatments used were managements '90-15', 'B-8', 'EB-8', '90-15, PB-15', and the last four managements listed in Table I for Chowmaker and Sweet Sioux. FS-531 and Millhy were subjected to managements 'EB-8' and '90-15, B-8', and 'EB-8' and '90-15' respectively. The experimental design had a split-plot factorial treatment set, arranged in a randomized complete block with four replications of the main treatments.

III. DATA COLLECTED

In both years two samples were taken at each harvest from each plot. A 2.13 m x .46 m sample was cut at the scheduled stubble height from a center row, dried and weighed for dry matter yield. A .30 m x .46 m sample, cut at ground level, was separated in the field into leaves about the height where the cut was scheduled for each management, leaves below the cut, and stems. These samples were placed in ice in the field, then frozen and stored for later processing. In the laboratory, the distance of primary and lateral meristems from the ground surface was measured. When lateral meristems initiated growth above the ground level, total height above the ground was recorded. After meristem heights were recorded, the culms were separated into portions which would have occurred above and below the scheduled stubble height. Leaf areas (blades excluding sheaths) were measured on an Automatic Area Meter (Hayashi Denko Co. Ltd. Type AAM-5) for green leaves above and below cut. Weights to the nearest 0.1 g were obtained for each of the four component parts after drying in a forced-draft oven at 65 C.

In vitro dry matter digestibility (IVDMD) was determined for 134 samples selected from samples harvested in 1976. The design was a simple lattice with two replications over time (5). Another IVDMD digestion was run on all above cut samples harvested in 1977. The design was a simple lattice with three replications over time (5). A modified Tilley and Terry (25) in vitro technique was used. It differed from the original method in that solka floc was used for standards and that abestos-matted filter crucibles were used to collect the residue. A fistulated steer, used as the source of rumen fluid, was fed alfalfa (Medicago sativa L.) hay.

The IVDMD values were adjusted for variability among blocks and replications using the least squares approach and the GLM procedure in SAS76 (1). Duncan's Multiple Range test was performed using the Duncan procedure from SAS76 (1).

Percent total N in plant tissue was determined on a dry weight basis. All above cut portions, leaves and stems, of the .30 x .46 m samples for a treatment at each harvest was composited, then analyzed for total N; the below cut portions were composited in similar fashion and also analysed for N. A 0.2 g portion of each composite sample was digested in concentrated sulfuric acid and in 35% hydrogen peroxide. The resultant extract was analyzed with a Technicon Autoanalyzer using the phenolhypochlorite color reaction described by Thomas et al. (24).

IV. PRESENTATION OF DATA

The nature of the data obtained did not permit analysis of variance procedures. Since there were many harvests at different times during each season, most data are presented graphically to describe the changes that occurred over time. Total seasonal dry matter yields were calculated and are presented to place the several treatments in proper perspective relative to each other. However, since the range of productivity was very large and number of cuts extremely varied, no combined statistical analysis was attempted. Instead, data are presented graphically to describe the changes over time, at each harvest, in DM yield, CP and IVDMD.

The plant characteristics were determined from total separation of plants harvested from small .30 x .46 m areas. The yields/ha of the 2.13 m x .46 m samples and of .30 m x .46 m samples were compared to determine if the .30 m x .46 m samples were a good estimate of the larger plots in both years. The R^2 values were .86 and .80 for 1976 and 1977, respectively, indicating that the smaller samples were indeed a good estimate of the larger plots.

To calculate weighted N percent and weighted IVDMD, N percent and IVDMD were separated into those from early season harvests (before 1 August) and those from late season harvests (after and including 1 August). The percent N and IVDMD were weighted for early and for late season DM production.

A total of 671 samples was analyzed for meristem heights, and individual data recorded for each culm. Skewness and kurtosis were determined for each sample to determine the extent to which these data approached normality in their distribution.

Precipitation and temperature were recorded daily at a climatological station about 200 m from the plots. Precipitation was summed for the season (cumulative precipitation) beginning at planting time and summed for periods of regrowth (regrowth precipitation). Period of regrowth included the time from the day of harvest until the day before the next harvest. Heat degree days were also summed for the season (cumulative degree days) and periods of regrowth (regrowth degree days) in the same manner (base temperature 15 C, maximum allowed 35 C).

The independent variables used in the predictive models are listed in the appendix. The dependent variables were yield per harvest, regrowth/day, total N percent, and IVDMD.

All data for all cultivars were entered into a discriminant analysis, and the results clearly indicated that the cultivars each belonged to a different population. Therefore, all subsequent analyses were conducted for each cultivar separately. Secondly, for each dependent variable, all independent variables were included in a factor analysis. When loading weights were similar for two or more independent variables, only one was kept. The selection of independent variables was made on the basis of ease and economy of data collection. After the selection of variables from the factor analysis results, the remaining independent variables were ranked from the "easiest" to obtain or the "cheapest" to measure to the more "difficult" or more expensive. The final ranking used was: number of days since March 1, number of days during regrowth, average plant height, cumulative precipitation, rainfall during regrowth periods, cumulative degree days, degree days during regrowth, culm population of previous cut/m^2, culm population/m^2, L.A.I. of the stubble, L.A.I. of total plant from previous cut, L.A.I. of total plant, stubble yield, leaf percent of harvest material, N content of stubble, in that order.

Subsequently, a predictive model was fitted to all observed data for each cultivar by least squares techniques. At first, those independent variables for which significant ($P \leq .10$) partial regression coefficient estimates were obtained in either sequential (Type I) or partial (Type III) sums of squares were retained. When two similar independent variables were retained (e.g., cumulative precipitation and precipitation since previous harvest) the model was attempted with only one of the two also, and both variables were included in the final model only if the exclusion of one appreciably decreased the coefficient of determination ($P \geq .05$). The predictive models reported are those which contain only independent variables for which the partial regression coefficient estimates were significant ($P \leq .10$), and which had the fewest and the "cheapest" or "easiest" variables, and still accounted for the largest attainable coefficients of determination.

CHAPTER III

RESULTS AND DISCUSSION

I. TOTAL DRY MATTER YIELDS

The total seasonal DM yields for each cultivar each year for each management treatment are presented in Table II. They ranged between 5,100 and 32,000 kg/ha. Differences were due not only to years and managements, but also to cultivars.

In general, the managements where plants were allowed to reach the later stages of growth produced more than those cut in the more vegetative stages. In the vegetative stages, plants cut at pre-boot produced more than those cut at a 90-cm height, and these yielded more than plants cut at 50 cm. This is in agreement with the results of many others (2, 4, 28).

Chowmaker (also known as Super Chow-Maker 235) yields were largest in 1976 from the two managements cut each time plants reached the B or EB stages (24,000 kg/ha) and smallest from the plants cut at 50 cm (5,800 kg/ha). The 1976 yields of the plants managed in different ways were ranked in the following manner from greatest to least:

'EB-8' = 'B-8'

'50-15, EB-8, B-8'

'50-15, EB-8, PB-15'

'50-15, EB-8, 75-15' = '50-15, B-8'

'50-15, B-8, 75-15' = '90-15, PB-15'

TABLE II

TOTAL SEASON YIELDS, AND NITROGEN AND IN VITRO DRY MATTER DIGESTIBLE (IVDMD) CONTENTS OF FOUR SUMMER ANNUAL GRASSES SUBJECTED TO DIFFERENT MANAGEMENTS IN EARLY AND LATE SUMMER, 1976-1977

Year	Cultivar	Season Yield	Weighted N		Weighted IVDMD	
			Before August 1	After August 1	Before August 1	After August 1
		kg/ha	%			
MGT 1:	50-CM GROWTH CUT TO 15-CM STUBBLE					
1976	Chowmaker 235	5830	2.40	3.40	79.0	80.2
	FS-531	5140	2.33	3.13	81.1	79.1
	Millhy 99	7370	2.15	2.98	80.2	81.7
	Sweet Sioux III	7775	2.25	3.15	79.5	78.3
MGT 2:	90-CM GROWTH CUT TO 15-CM STUBBLE					
1976	Chowmaker 235	10300	2.04	2.71	77.1	76.8
	FS-531	9690	2.01	2.52	74.8	75.9
	Millhy 99	10010	1.79	2.28	79.3	77.4
	Sweet Sioux III	11770	2.22	2.31	79.9	76.2
MGT 3:	PRE-BOOT CUT TO 15-CM STUBBLE					
1976	Chowmaker 235	14900	1.43	1.62		
	FS-531	15715	1.05	2.00		
	Millhy 99	10165	1.70	2.65		
	Sweet Sioux III	17310	1.43	1.50		

TABLE II (Continued)

Year	Cultivar	Season Yield	Weighted N Before August 1	Weighted N After August 1	Weighted IVDMD Before August 1	Weighted IVDMD After August 1
		kg/ha	%			
MGT 4:	BOOT CUT TO 8-CM STUBBLE					
1976	Chowmaker 235	24150	0.63	1.48	61.2	64.7
	FS-531	29830	1.08	1.45	64.8	67.6
	Millhy 99	11110	1.11	2.38	72.5	79.1
	Sweet Sioux III	21780	1.28	1.57	71.4	71.8
MGT 5:	EARLY BLOOM CUT TO 8-CM STUBBLE					
1976	Chowmaker 235	24180	0.53	1.13	62.6	
	FS-531*	26755	0.74	2.09	60.2	
	Millhy 99	13180	1.22	2.30	70.2	75.1
	Sweet Sioux III	24835	0.65	1.13	69.3	64.8
MGT 6:	50 CM-GROWTH CUT TO 15-CM STUBBLE ONCE, THEN 90-CM CUT TO 15 CM					
1976	Chowmaker 235	10085	2.52	2.49	76.7	76.3
	FS-531	10515	1.91	2.37	78.1	77.6
	Millhy 99	9730	1.96	2.68	80.1	75.4
	Sweet Sioux III	10730	2.39	2.21	78.2	77.7
MGT 7:	50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN 90 CM TO 15 CM ONCE, THEN 50 CM TO 15 CM, TWICE, THEN 75 CM TO 15 CM					
1976	Chowmaker 235	8050	2.39	2.81		
	FS-531	8200	1.71	2.77		
	Millhy 99	8400	2.03	2.54		
	Sweet Sioux III	9200	2.38	2.73		

TABLE II (Continued)

Year	Cultivar	Season Yield	Weighted N		Weighted IVDMD	
			Before August 1	After August 1	Before August 1	After August 1
		kg/ha	%			
MGT 8:	90-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN PRE-BOOT CUT TO 15 CM					
1976	Chowmaker 235	16860	1.18	1.58	68.5	71.2
	FS-531	14975	1.94	1.53	74.7	66.7
	Millhy 99	8940	1.73	2.53	78.2	78.1
	Sweet Sioux III	16680	1.30	1.83	73.2	73.2
MGT 9:	50-CM GROWTH CUT TO 15-CM STUBBLE, PRE-BOOT CUT TO 15 CM, 50-CM CUT TO 15 CM, EACH ONCE, THEN 75-CM CUT TO 15 CM					
1976	Chowmaker 235	11510	1.59	2.56		
	FS-531	16440	0.96	3.04		
	Millhy 99	9985	1.71	2.34		
	Sweet Sioux III	12080	1.89	2.38		
MGT 10:	50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN BOOT CUT TO 8 CM					
1976	Chowmaker 235	18685	1.03	1.25		
	FS-531	30440	2.39	1.42		
	Millhy 99	9130	1.92	2.13		
	Sweet Sioux III	17190	1.41	1.80		
MGT 11:	50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, BOOT CUT TO 8 CM ONCE, THEN 75 CM CUT TO 15 CM					
1976	Chowmaker 235	16485	1.02	2.44		
	FS-531	26275	2.58	1.48		
	Millhy 99	10400	1.96	1.84		
	Sweet Sioux III	14550	1.43	2.20		

TABLE II (Continued)

Year	Cultivar	Season Yield	Weighted N Before August 1	Weighted N After August 1	Weighted IVDMD Before August 1	Weighted IVDMD After August 1
		kg/ha	%			
MGT 12: 50-CM GROWTH CUT TO 15-CM STUBBLE TWICE, BOOT CUT TO 8 CM ONCE, THEN 75 CM CUT TO 15 CM						
1976	Chowmaker	14840	2.39	1.26	81.0	65.4
	FS-531	17870	2.33	1.58		65.2
	Millhy 99	9100	1.87	2.22	79.5	78.7
	Sweet Sioux III	13265	1.53	2.38	72.2	77.4
MGT 13: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, EARLY BLOOM CUT TO 8 CM ONCE, THEN 75 CM CUT TO 15 CM						
1976	Chowmaker 235	18480	1.33	2.78		
	FS-531	20325	2.39	1.43		
	Millhy 99	11125	1.26	2.02		
	Sweet Sioux III	16020	1.11	2.09		
MGT 14: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, EARLY BLOOM CUT TO 8 CM ONCE, THEN PRE-BOOT CUT TO 15 CM						
1976	Chowmaker 235	20280	1.33	1.60	60.9	65.5
	FS-531	22020	2.39	1.38	82.9	66.2
	Millhy 99	9760	1.26	2.32	76.9	62.8
	Sweet Sioux III	17315	1.11	1.87	68.1	74.0

TABLE II (Continued)

Year	Cultivar	Season Yield	Weighted N		Weighted IVDMD	
		kg/ha	Before August 1	After August 1	Before August 1	After August 1
MGT 15:	50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, EARLY BLOOM CUT TO 8 CM ONCE, THEN BOOT CUT TO 8 CM					
1976	Chowmaker 235	22645	1.34	1.77	61.1	67.4
	FS-531	22425	2.17	1.28	82.9	66.4
	Millhy 99	11055	1.17	2.32	56.5	74.7
	Sweet Sioux III	17660	1.11	1.83	68.0	67.0
MGT 2:	90-CM GROWTH CUT TO 15-CM STUBBLE					
1977	Chowmaker 235	10575	2.55	1.90	76.3	69.9
	Millhy 99	11680	2.92	1.47	72.1	69.8
	Sweet Sioux III	9395	2.53	2.20	75.6	70.8
MGT 4:	BOOT CUT TO 8-CM STUBBLE					
1977	Chowmaker 235	23570	1.45	1.19	59.1	68.0
	Sweet Sioux III	18950	2.33	1.36	63.8	65.8
MGT 5:	EARLY BLOOM CUT TO 8-CM STUBBLE					
1977	Chowmaker 235	25140	1.09	1.28	67.5	49.8
	FS-531	32025	0.83	0.99	52.4	60.9
	Millhy 99	12415	2.15	1.77	69.0	66.0
	Sweet Sioux III	25370	2.50	1.26	61.6	64.9

TABLE II (Continued)

Year	Cultivar	Season Yield	Weighted N Before August 1	Weighted N After August 1	Weighted IVDMD Before August 1	Weighted IVDMD After August 1
		kg/ha				
MGT 8: 90-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN PRE-BOOT CUT TO 15 CM						
1977	Chowmaker 235	15995	2.06	1.50	63.1	67.9
	Sweet Sioux III	12185	2.22	1.32	69.4	65.9
MGT 16: 90-CM GROWTH CUT TO 8-CM STUBBLE						
1977	Chowmaker 235	10015	2.73	2.08	82.8	70.2
	Sweet Sioux III	9760	2.64	2.01	76.7	67.5
MGT 17: 90-CM GROWTH CUT TO 8-CM STUBBLE ONCE, THEN PRE-BOOT CUT TO 15 CM						
1977	Chowmaker 235	14320	1.36	1.77	73.5	67.7
	Sweet Sioux III	17920	1.74	1.36	69.7	65.8
MGT 18: 90-CM GROWTH CUT TO 8-CM STUBBLE ONCE, THEN BOOT CUT TO 8 CM						
1977	Chowmaker 235	17450	2.31	1.10	73.6	65.9
	Sweet Sioux III	18605	1.65	1.60	76.7	65.6
MGT 19: 90-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN BOOT CUT TO 8 CM						
1977	Chowmaker 235	20730	2.84	1.39	79.0	68.5
	FS-531**	16290	2.82	1.34	75.7	58.1
	Sweet Sioux III	17870	1.40	0.95	76.3	66.1

*First harvest which occurred after August 1 was included in the early season.

**The second harvest was included in the late season.

'PB-15' = '50-15, 50-15, B-8, 75-15'

'50-15, PB-15, 50-15, 75-15'

'50-15, 90-15' = '90-15'

'50-15, 90-15, 50-15, 50-15, 75-15'

'50-15'.

In 1977, a similar ranking was observed for the managements that were studied that year:

'EB-8'

'B-8'

'90-15, B-8'

'90-8, B-8'

'90-15, PB-15'

'90-8, PB-15'

'90-15' = '90-8'

Sweet Sioux yields followed a trend similar to that observed for Chowmaker, with the largest yields obtained from plants cut at EB and the smallest from plants cut at 50 cm. Yields in 1976 of the plants managed in different ways were ranked as follows:

'EB-8'

'B-8'

'50-15, EB-8, B-8' = '50-15, EB-8, PB-15' = '50-15, B-8' =
'PB-15' = '90-15, PB-15'

'50-15, EB-8, 75-15' = '90-15, PB-15'

'50-15, B-8, 75-15'

'50-15, 50-15, B-8, 75-15'

'50-15, PB-15, 50-15, 75-15' = '90-15'

'50-15, 90-15'

'50-15, 90-15, 50-15, 50-15, 75-15'

'50-15'.

In 1977, yields were smaller than in 1976 for all Sweet Sioux plants with the same managements in both years, except for those cut at 'EB-8' which yielded the same. When the yields from managements were ranked, they occurred as follows:

'EB-8'

'B-8' = '90-8, B-8'

('90-15, B-8' = '90-8, B-8') = '90-8, PB-15'

'90-15, PB-15'

'90-8' = '90-15'

FS-531 grown in 1976 was unusual, since plants cut at the 'B-8' or '50-15 then B-8' yielded about 3,000 kg/ha more than those cut according to the 'Eb-8' management. The yields of the different plant managements were ranked as follows:

'B-8' = '50-15, B-8'

'EB-8' = '50-15, B-8, 75-15'

'50-15, EB-8, B-8' = '50-15, EB-8, PB-15'

'50-15, EB-8, 75-15'

'50-15, 50-15, B-8, 75-15'

'50-15, PB-15, 50-15, 75-15 = 'PB-15'

'90-15, PB-15' = 'PB-15'

'90-15' = '50-15, 90-15'

'50-15' = '50-15, 90-15, 50-15, 50-15, 75-15'.

In 1977, FS-531 plants from the 'EB-8' management yielded about 5,000 kg/ha more than in 1976. This yield (32,000 kg/ha) was the highest that year. The other management, '90-15, B-8', yielded about half of the yield measured in the 'EB-8' management.

The pearlmillet Millhy had a smaller range in yields than the other cultivars. The largest yield (13,200 kg) resulted from plants allowed to reach the EB stage and cut to 8-cm stubble. The smallest yields were obtained from management '50-15' or '50-15, 90-15, 50-15, 50-15, 75-15'. The yields from the other managements ranged from 8,900 to 11,100 kg/ha and fell into two main groups, 8,900-9,800 kg/ha and 10,000-11,100 kg/ha. Two of the managements used in 1976 were repeated in 1977. Management '90-15' had a larger yield in 1977 than the previous year, and the same yield was observed both years for plants cut at 'EB-8'.

In general, where there were fewer harvests, the greater were the yields. Plants allowed to grow taller or to more mature stages yielded more per harvest and season. An exception was FS-531 in 1976, which yielded more in the 'B-8' or '50-15, B-8' managements than when subjected to the 'EB-8' management.

FS-531 generally yielded most in managements with B or EB stages of growth. The exception was management '50-15, EB-8, B-8', which resulted in the largest yields for both FS-531 and Chowmaker. Millhy was generally the smallest yielding; however, in managements cut at 90 cm or 50 cm, yearly total yields were the same for all cultivars or differed at most by 2,600 kg/ha in management '50-15'. Chowmaker total yields were greater than those of Sweet Sioux in management 'B-8' in 1976 and 1977, or when plants were harvested at 50 cm prior to the B or EB cuts in 1976.

In 1977, Chowmaker plants yielded more than Sweet Sioux plants when a PB or B harvest preceded by a 90-cm harvest was cut to a 15-cm stubble. However, Sweet Sioux yielded more than Chowmaker when the PB or B harvest was preceded by a 90-cm harvest cut to a 8-cm stubble, or in managements 'PB-15' or '50-15, 90-15, 50-15, 50-15, 75-15' in 1976. The stubble height of a single harvest produced different results in the two cultivars. Chowmaker yielded more per season when cut at 90 cm down to a 15-cm stubble, rather than at 8 cm, when this was followed by PB or B cut; however, Sweet Sioux yielded more per season when the 8-cm stubble height was used instead of 15 cm for the 90-cm harvest. The yields from the other managements were not different for these two cultivars.

II. SEASONAL DISTRIBUTION OF DRY MATTER YIELDS

Both cultivars and managements had considerable effect on the distribution of DM production during the season (Figures I and II). In 1976, the B or EB harvests for Chowmaker, Sweet Sioux and Millhy occurred on the same day within a management, regardless of whether or not a 50-15 cut had been made. This harvest day was the same because the plants had reached the pre-determined stage of growth at that time. However, when a 50-15 cut had preceded a B or EB cut, the yields at these more mature harvest stages were decreased. Sometimes the EB harvest yields were decreased by as much as half when Sweet Sioux had been cut to 50 cm previous to the EB harvest (management '50-15, EB-8,

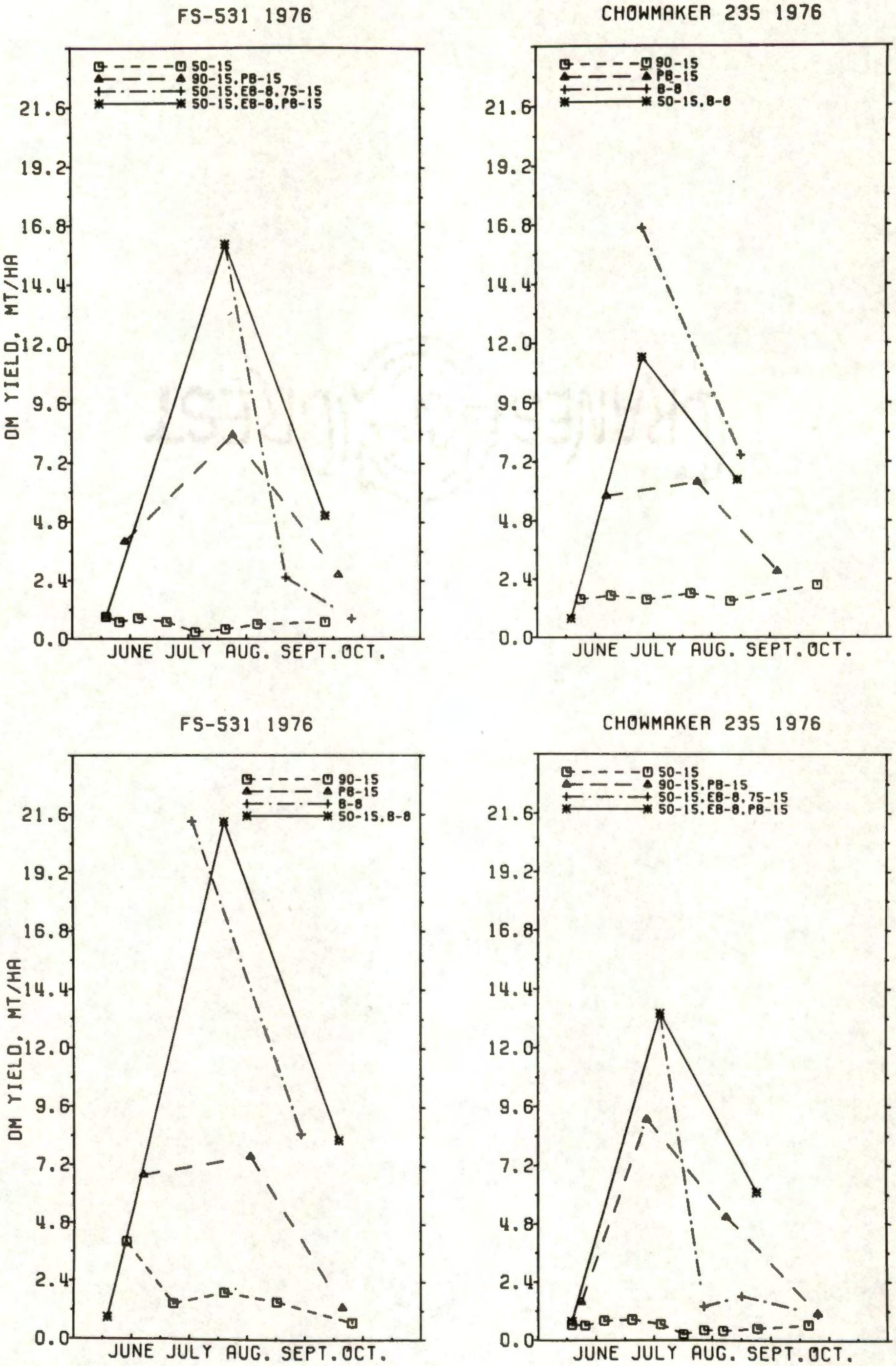

FIGURE I. SEASONAL DISTRIBUTION OF DRY MATTER PRODUCTION FOR MANAGEMENTS HARVESTED IN VEGETATIVE AND BOOT STAGES OF GROWTH, AND COMBINATIONS OF THE VEGETATIVE, BOOT, AND EARLY BLOOM STAGES FOR CHOWMAKER AND FS-531, 1976.

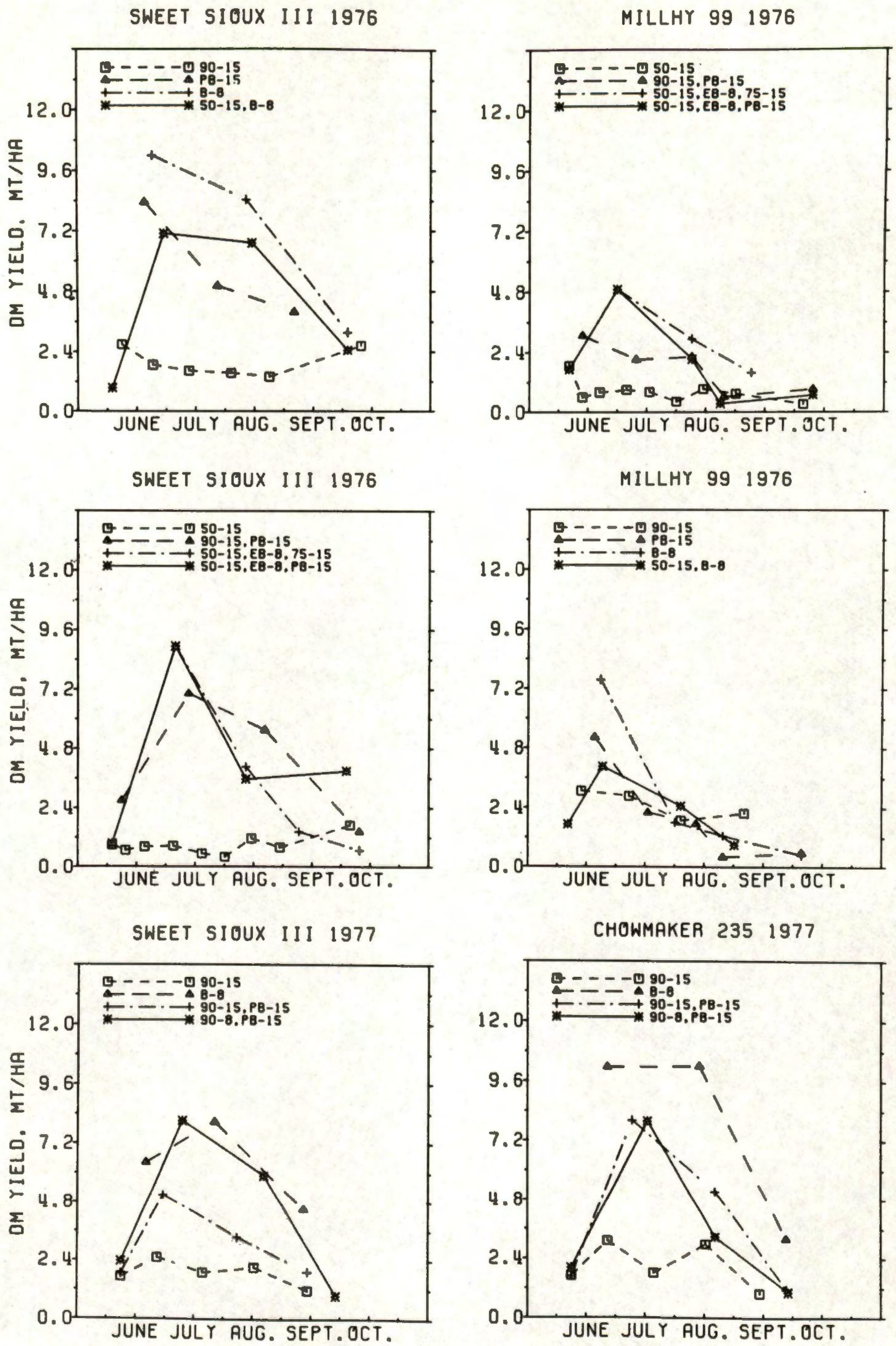

FIGURE II. SEASONAL DISTRIBUTION OF DRY MATTER PRODUCTION FOR MANAGEMENTS HARVESTED IN VEGETATIVE AND BOOT STAGES AND COMBINATIONS OF THE VEGETATIVE, BOOT AND EARLY BLOOM STAGES FOR SWEET SIOUX AND MILLHY IN 1976, AND SWEET SIOUX AND CHOWMAKER IN 1977.

75-15'), as compared to the first EB harvest in management 'EB-8' (Figure II).

FS-531 did not decrease in yield when the B or PB harvest was preceded by a 50-15 cut, but harvest was delayed. When an EB cut was preceded by a 50-15 cut, yields were decreased and harvest delayed. A 90-15 cut before a PB cut delayed harvest for all cultivars, increased the yield of FS-531 and decreased the yields of the other cultivars.

The PB harvests of Sweet Sioux were delayed by a preceding 90-8 cut (management '90-8, PB-15', Figure II, 1977) but the plants exposed to that management yielded more than those allowed to reach the PB following a 90-15 cut (management '90-15, PB-15'). In the same two managements, Chowmaker yielded about the same or slightly more when the 90-15 cut preceded the PB in management '90-15, PB-15'. The second or PB harvest was the only one delayed. Results from managements '90-8, B-8' and '90-15, B-8' exhibited the same trends for both Sweet Sioux and Chowmaker in the boot stage.

Managements '50-15' and '90-15' produced forage uniformly over the entire season. Managements which had a 90-cm cut before the PB, B or EB resulted in delayed harvests for all cultivars. The PB, B or EB harvests of FS-531 also were delayed by a previous 50-cm harvest. In many cases, delayed harvests can be advantageous, since greater production later in the year may render hay making more feasible than earlier in the season because of less rainfall (Figure III).

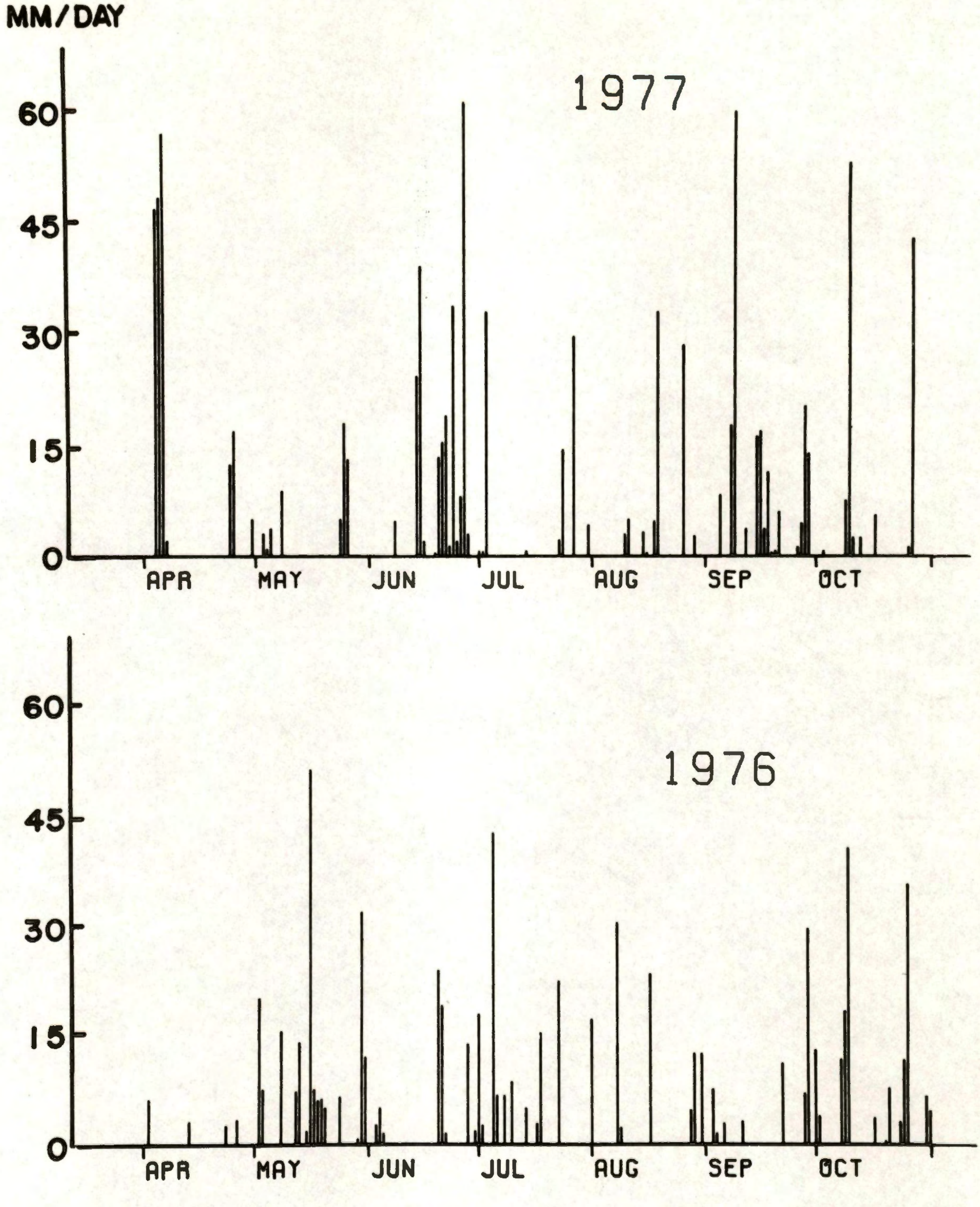

FIGURE III. DAILY PRECIPITATION DURING THE SUMMER ANNUAL GRASS GROWING SEASONS, 1976-1977.

III. TOTAL NITROGEN CONTENT

Nitrogen content of harvested material was greatest for those managements harvested more frequently and at more vegetative stages of growth (Figures IV and V). The first N fertilizer applications in 1976 (54 kg N/ha) resulted in forage containing about 1.1 to 2.6% N at the beginning of the season if harvested at 50 or 90 cm or PB. The B and EB material contained only 0.5 to 1.5% N at its first harvest. In 1977, plants contained about 3.1 to 2.1% N for the first 90 cm harvest following the N fertilizer application (292 kg N/ha), while the B and EB material contained from 2.5 to 0.8% N. The higher content in 1977 was a result of the higher rate of N applied in early summer. Sweet Sioux plants cut at B or EB had two to three times the total N content in 1977 as in 1976. No other cultivar responded to increased N/ha as did Sweet Sioux.

When Chowmaker and Sweet Sioux were harvested in management 'PB-15', the N content did not increase until the last harvest (Figures IV and V), but FS-531 and Millhy in the same management (Figures IV and V) increased or remained the same in N content in each successive harvest over the season. Millhy, however, dropped in N content at the last harvest. In management 'B-8', total N percent increased during the season for Chowmaker, FS-531, and Millhy in 1976. Sweet Sioux and Chowmaker did not vary greatly in N content over the season in 1976, and Chowmaker did not either in 1977, but Sweet Sioux decreased in N content after the first harvest in 1977.

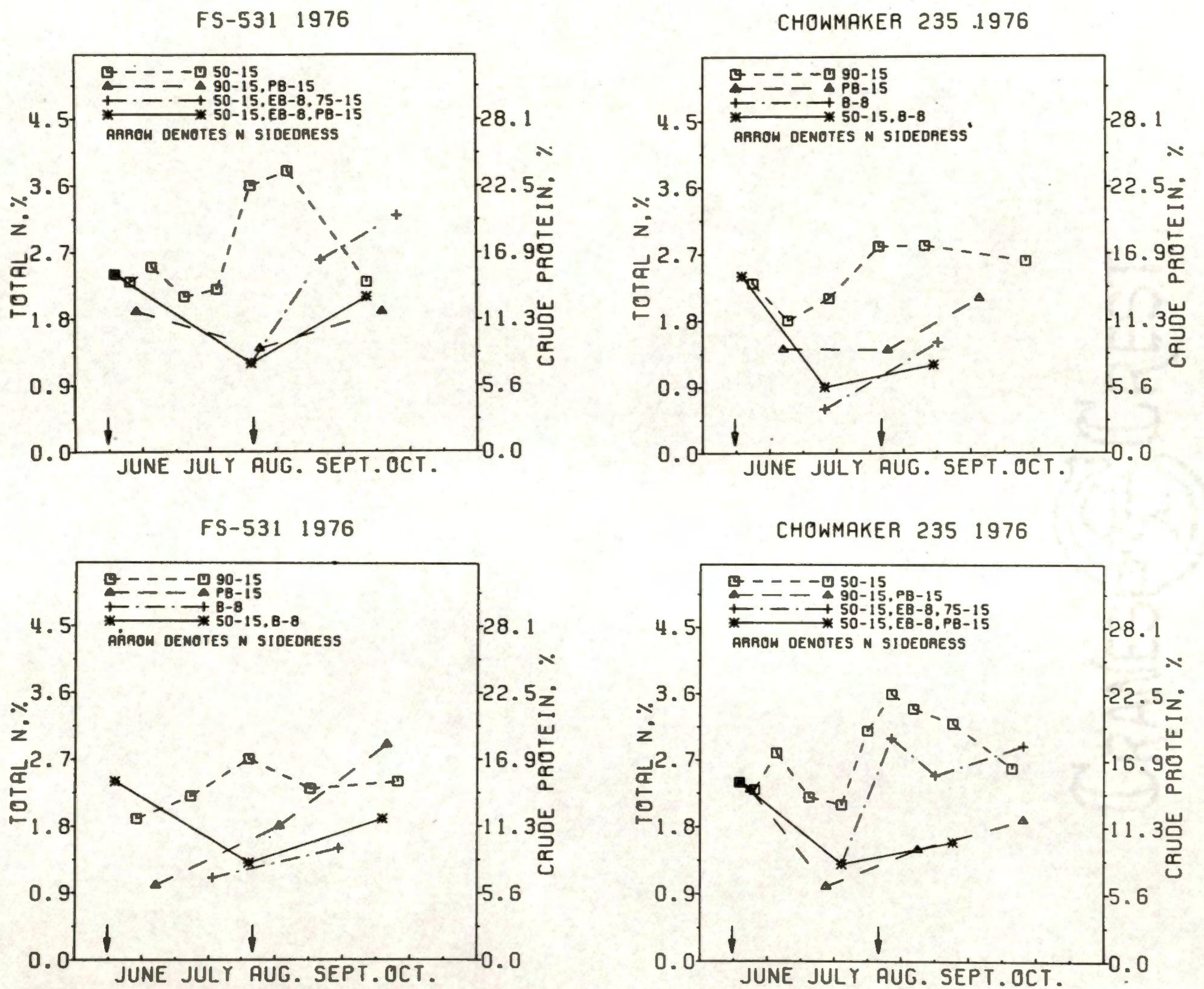

FIGURE IV. SEASONAL TRENDS OF N CONTENT OF PLANTS HARVESTED IN VEGETATIVE AND BOOT STAGES OF GROWTH AND COMBINATIONS OF THE VEGETATIVE, BOOT AND EARLY BLOOM STAGES FOR CHOWMAKER AND FS-531, 1976.

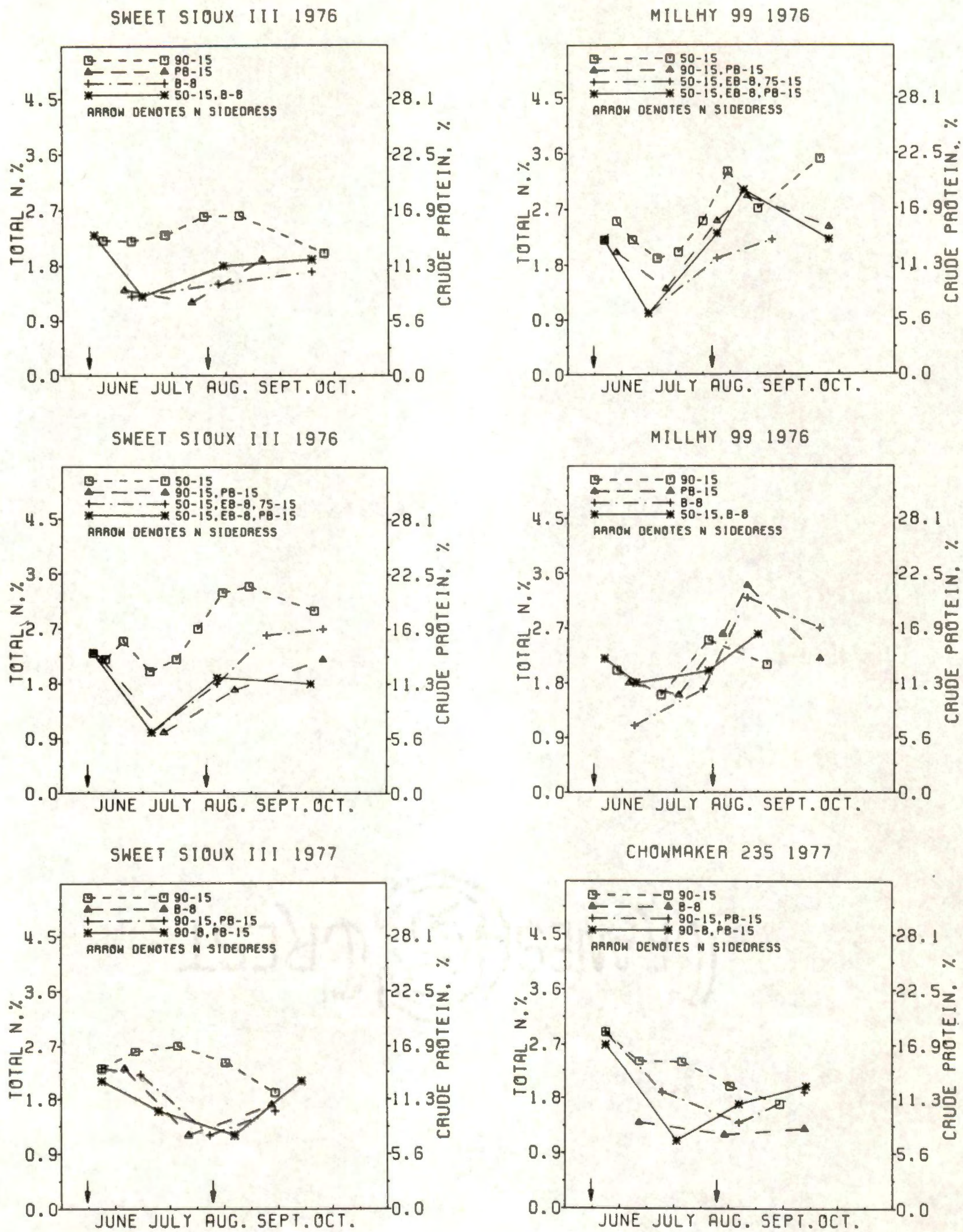

FIGURE V. SEASONAL TRENDS OF N CONTENT OF PLANTS HARVESTED IN VEGETATIVE AND BOOT STAGES OF GROWTH AND COMBINATIONS OF THE VEGETATIVE, BOOT AND EARLY BLOOM STAGES FOR SWEET SIOUX AND MILLHY IN 1976, AND SWEET SIOUX AND CHOWMAKER IN 1977.

When a management was used which removed material at a uniform and vegetative stage of growth (50 cm, 90 cm, PB), the N percent tended to remain at about the same level during the season, at least until the second N fertilization resulted in an increase. When plants were harvested at the B or EB stage, N content decreased in July and did not appear to increase until the next fertilization and after a rain.

The fluctuations in N content of plants in management '50-15' during the entire season were similar for all cultivars. Trends observed for plants subjected to '90-15', within each cultivar, were very similar to those of '50-15' plants; however, N content of '90-15' plants was lower (Table II, p. 16) and varied less than the N content of plants subjected to the '50-15' management.

IV. WEIGHTED N CONTENT

The N content of plants harvested at each cut was adjusted for the yields measured before and after 1 August to obtain a weighted N content for each half of the season (Table II, p. 16). The effect of developmental age and maturity on the total N content of plants subjected to different managements was pronounced and different for the several cultivars. Plants cut frequently in vegetative stages had between 2.4 and 1.8% N during early summer in 1976 and between 3.4 and 2.3% in late summer. When cut at the B or EB, plants ranged from 1.3 to 0.5% in early summer and from 2.4 to 1.1% in late summer.

In 1977, weighted N contents were higher for management '90-15' in early summer than in 1976, but late summer values were lower than in

1976. When plants were cut at the B or EB stages, the N percent was higher in early summer in 1977 than in 1976, and late summer values were again lower. Early summer values ranged between 2.5 and 0.8% N, and late summer values ranged from 1.8 to 1.0% N.

In 1976, a 50-15 cut preceding PB, B, and EB harvests resulted in greater weighted N percent of all cultivars above that measured from plants cut repeatedly at PB, B or EB stages only. This occurred because not only the high N content of the first cut material increased the weighted N content, but also because in some cases, the N percent of the plants cut at PB, B, and EB following the initial 50-15 harvest was higher than that measured from plants initially cut at PB, B, or EB. Thus, the early season weighted N percent was increased. Both situations occurred with the EB-managed sorghum-sudangrass hybrids; the B management of Chowmaker, FS-531 and Millhy, and the PB-managed Sweet Sioux. The 90-15 harvest preceding the PB stage cut resulted in a decrease in N percent of the plants cut at PB, compared to all plants cut continuously at PB to a 15-cm stubble except FS-531, which increased about 0.3% N.

In 1977, all the early summer weighted total N contents were higher than in 1976 for those managements that were studied both years, and the late season N percents were generally lower. Sweet Sioux had the same late summer N content in both years in managements '90-15' and 'EB-8'; Chowmaker N percent was the same in both years during late season in managements '90-15, PB-15' and 'EB-8'. The greater easly season N contents observed in 1977 were probably due to the higher rate of N fertilizer applied the second year.

A 300 kg growing steer consuming at least 8.1 kg roughage/day needs 10.0% CP (1.6% N) and a mimimum of 70% TDN (15). The forage harvested in 1976 which met these minimum requirements were obtained from the '50-15', '50-15, 90-15', '50-15, 90-15, 50-15, 50-15, 75-15' managements for all cultivars; from management '50-15, PB-15, 50-15, 75-15' for Sweet Sioux and Chowmaker; and from all the PB or B harvests preceded by 50 or 90 cm cuts for Millhy and 'PB-15' for Millhy (Table II, p. 16).

In 1977, managements '90-15' and '90-8' for the two sorghum-sudangrass hybrids resulted in plants which met the above minimum requirements. Other managements which had plants that appeared to have met these requirements but may have had low late season weighted IVDMD were 'EB-8' for Millhy, '90-8, B-8' for Sweet Sioux and '90-15, B-8' for Chowmaker.

V. IN VITRO DRY MATTER DIGESTIBILITY

In vitro DM digestibility for all samples analyzed ranged from 82.9 to 49.8% for both years (Table II, p. 16) and from 82.9 to 59.7% in 1976 (Figure VI). As expected, IVDMD of B and EB plant material was much lower than that of material harvested at younger stages of maturity. Many IVDMD values, if used as estimators of total digestible nutrients (TDN), exceeded the minimum TDN requirements for the growing steer example used earlier (15).

In 1976, managements with cuts at 50 and 90 cm resulted in the largest IVDMD values for all cultivars (Table II, p. 16), as well as

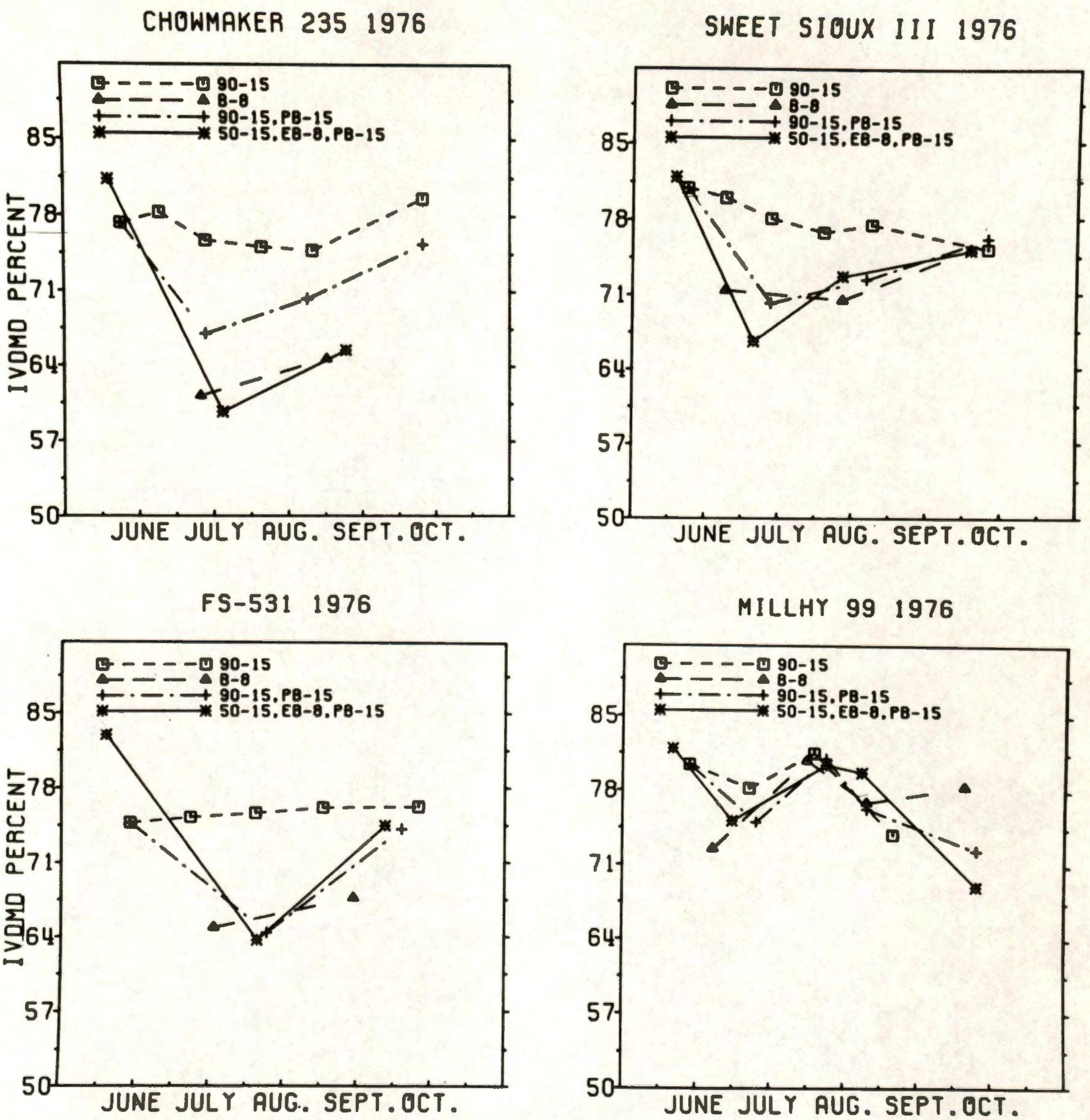

FIGURE VI. SEASONAL TRENDS IN IVDMD FOR MANAGEMENTS '90-15', 'B-8', '90-15, PB-15', '50-15, EB-8, PB-15' FOR FOUR SUMMER ANNUAL GRASSES, 1976.

managements '90-15, PB-15' and '50-15, 50-15, B-8, 75-15' for Millhy. Smallest in IVDMD were Chowmaker and FS-531 plants cut continuously at the B or EB growth stages, and Chowmaker plants subjected to the '50-15, EB-8, PB-15' management. Sweet Sioux and Millhy were generally higher in IVDMD than Chowmaker and FS-531 for the same managements.

In 1977, plants cut at 90 cm also had the largest IVDMD values, as well as those from the '90-15, B-8' management for Chowmaker and Sweet Sioux. Sweet Sioux and FS-531 plants had the smallest IVDMD when cut continuously at 'EB-8'. All 1977 IVDMD values were equal to or less than the IVDMD measured for the same managements in 1976, never higher.

In 1977, differences in stubble height did not result in yield differences between the '90-15' and '90-8' managements applied to Chowmaker and Sweet Sioux; there was also no difference in IVDMD between these two managements. Managements '90-8, B-8' and '90-15, B-8' also had IVDMD values which were not different from each other between managements and within cultivars. However, FS-531 plants had a smaller late season IVDMD in management '90-15, B-8' than the other cultivars. The PB plants of Chowmaker preceded by a 90-cm cut to an 8-cm stubble resulted in a higher IVDMD than the PB plants preceded by a 90-cm harvest cut to a 15-cm stubble, but this was not the case for Sweet Sioux.

The seasonal trends in 1976 IVDMD values are illustrated for four managements and four cultivars in Figure VI. The largest values were obtained from plants harvested at 50 cm for all cultivars; the smallest were from plants cut at B and EB for all cultivars, and at PB for all cultivars except Chowmaker.

The sorghum-sudangrass hybrids subjected to the '90-15' management had relatively uniform IVDMD throughout the season, and so did the Sweet Sioux plants cut at 'B-8'. The other managements usually resulted in IVDMD values which had a minimum in July. Since FS-531 matured later than the other cultivars, the smallest IVDMD for this crop occurred in August. Millhy plants had small IVDMD both in July and at the end of the season for all managements. The IVDMD of this cultivar did not seem to be affected by management, since the trend in IVDMD over time was the same for almost all managements. After the minimum was reached in July, the IVDMD of the sorghum-sudangrass hybrids tended to increase until the end of the growing season.

VI. PLANT AND MERISTEM HEIGHTS

The average heights of plants and terminal meristems of each cultivar and for each management at each harvest are illustrated in Figures VII - XI. Plants which were scheduled to be cut at 50 or 90 cm in height were in fact cut close to those heights. The height of plants cut at the PB, B and EB stages varied over the season for each cultivar and was influenced by the previous harvest. Average meristem height almost always paralleled average plant height--and at a lower level--over the growing season, except at the end of the season when average meristem heights approached average plant heights.

It is appropriate to consider here the nature and distribution of plant and meristem heights within the samples collected from the 0.30 x 0.46 m sampling areas (Table III). Primary culm and tiller

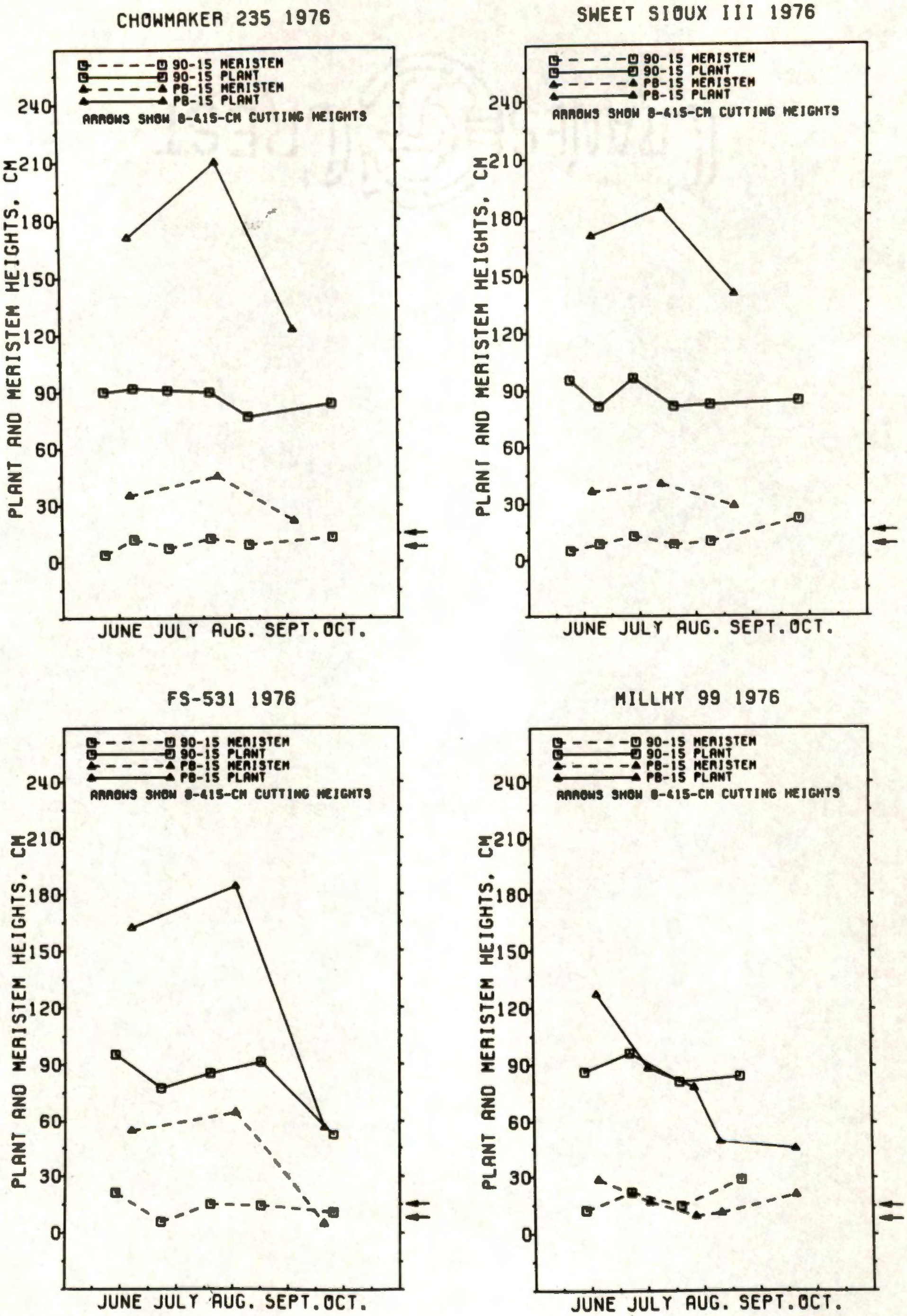

FIGURE VII. PLANT AND MERISTEM HEIGHTS OF FOUR SUMMER ANNUAL GRASSES SUBJECTED TO THE '90-15' AND 'PB-15' MANAGEMENTS, 1976.

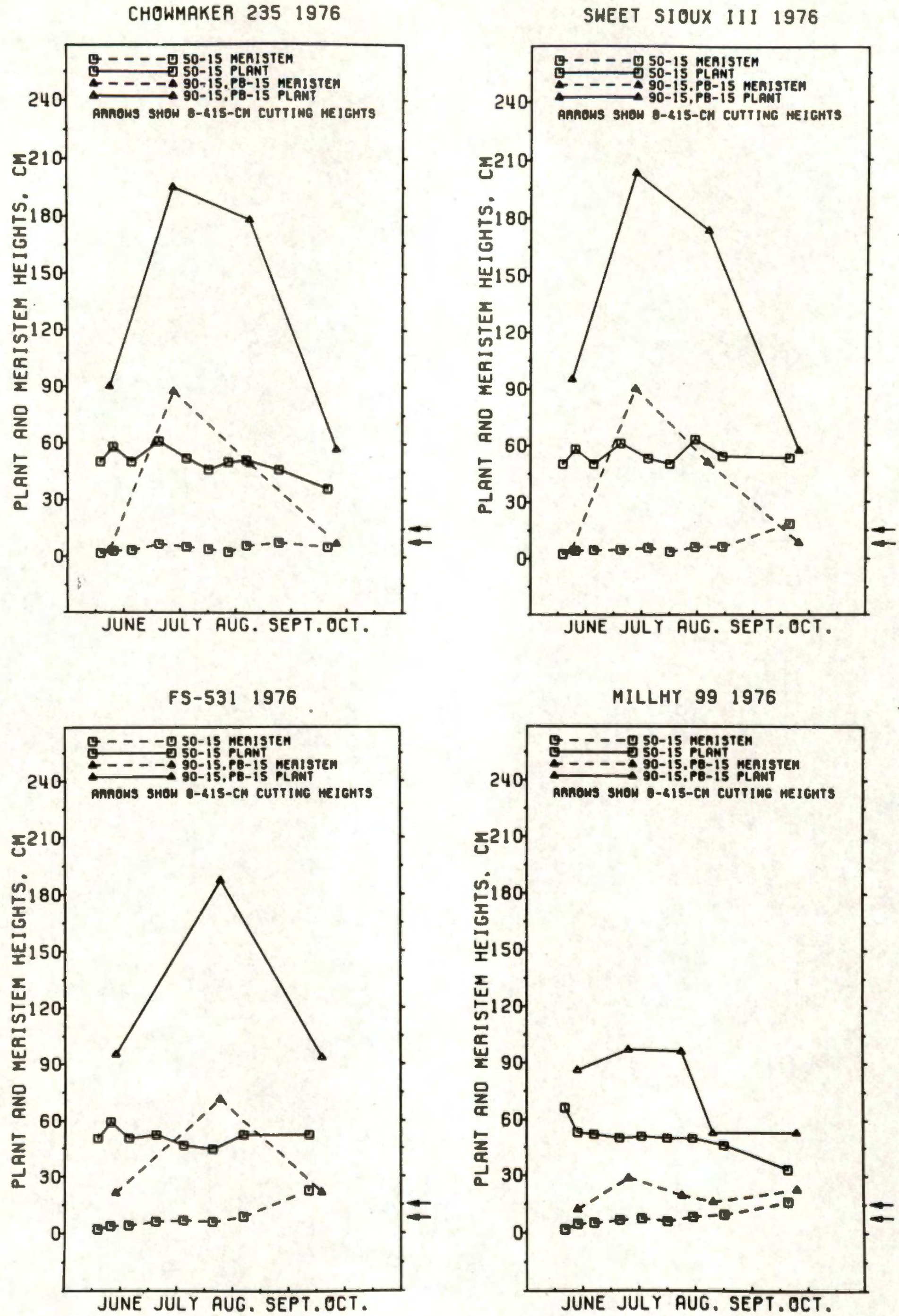

FIGURE VIII. PLANT AND MERISTEM HEIGHTS OF FOUR SUMMER ANNUAL GRASSES SUBJECTED TO THE '50-15' AND '90-15, PB-15' MANAGEMENTS, 1976.

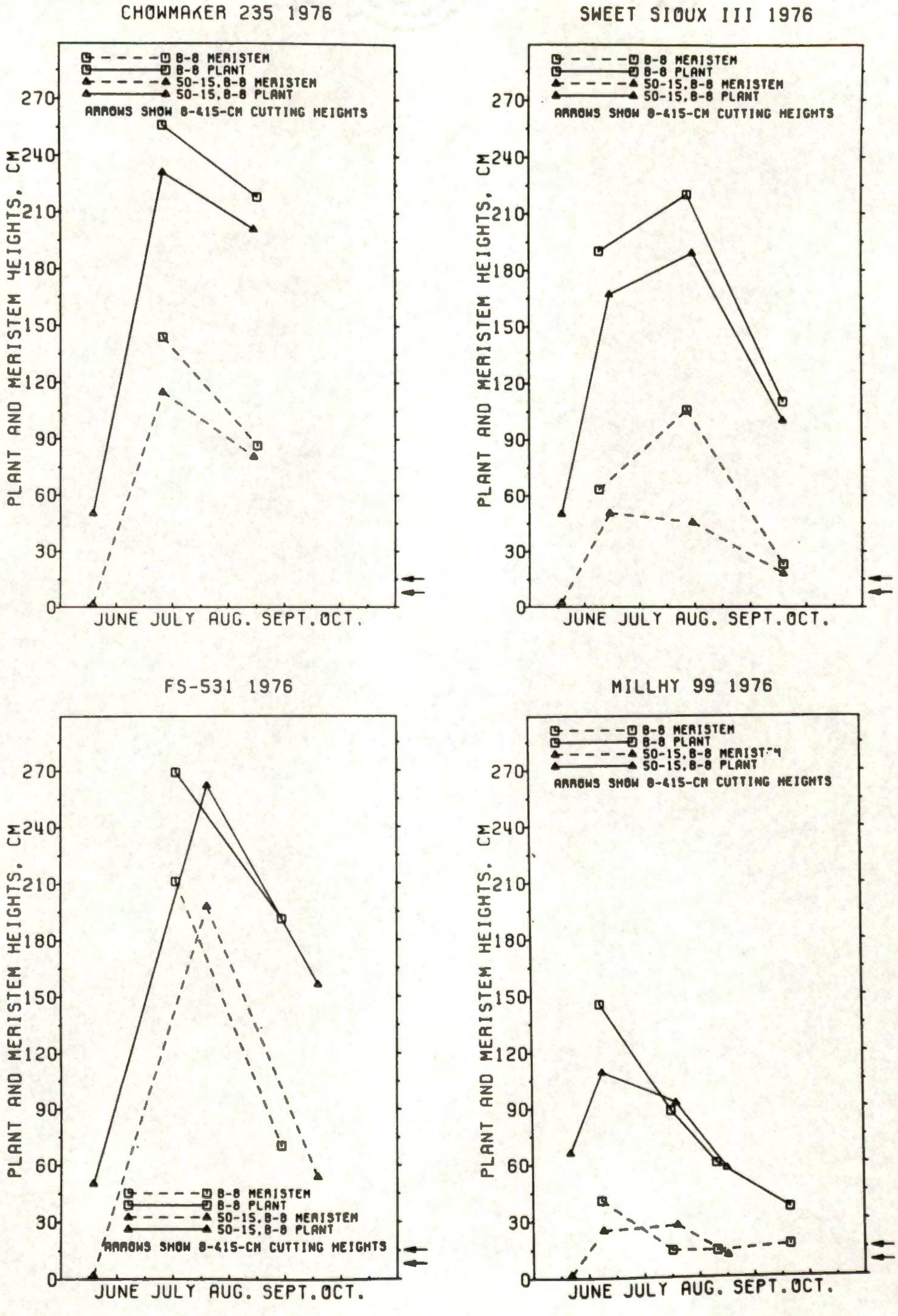

FIGURE IX. PLANT AND MERISTEM HEIGHTS OF FOUR SUMMER ANNUAL GRASSES SUBJECTED TO THE 'B-8' AND '50-15, B-8' MANAGEMENTS, 1976.

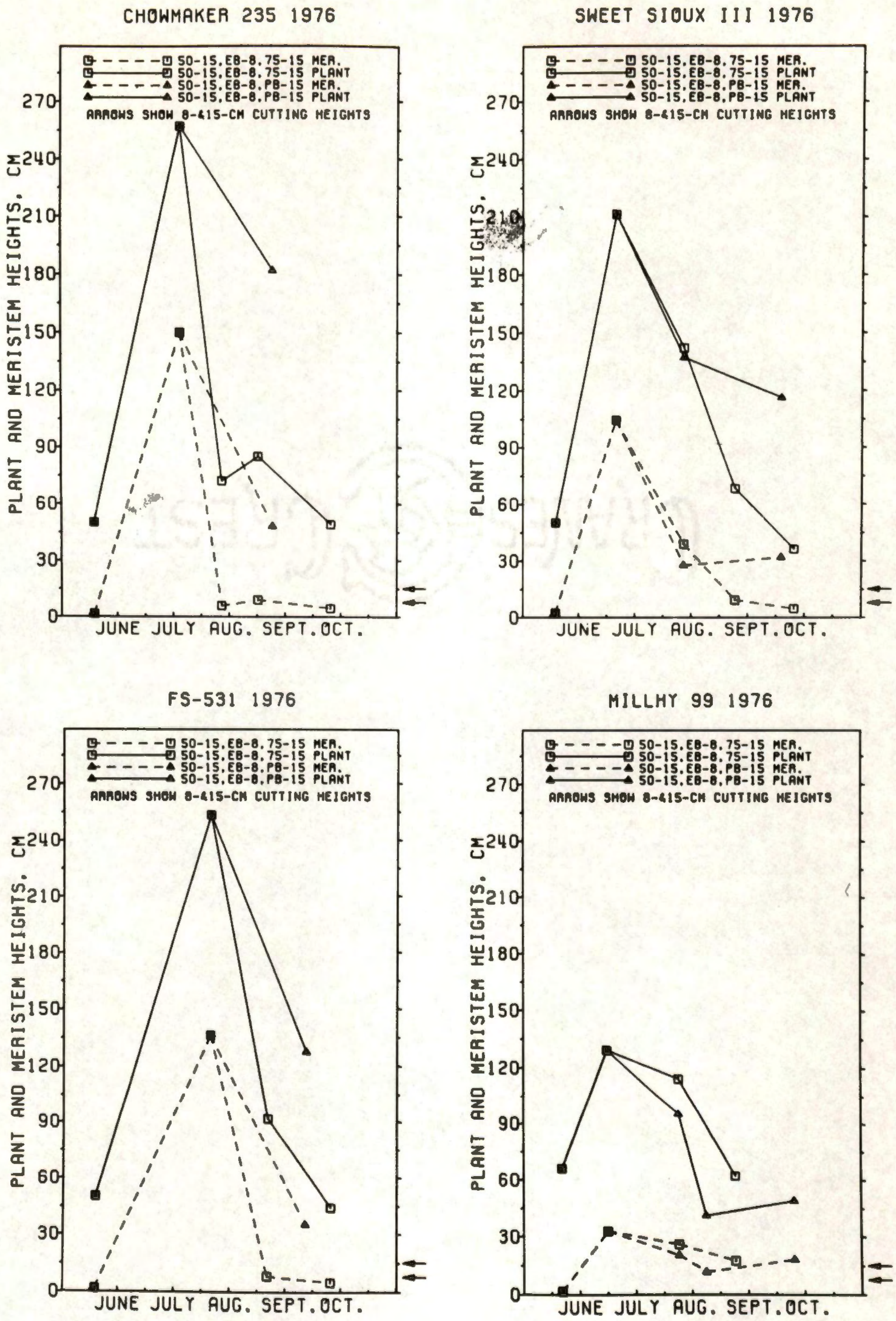

FIGURE X. PLANT AND MERISTEM HEIGHTS OF FOUR SUMMER ANNUAL GRASSES SUBJECTED TO THE '50-15, EB-8, 75-15' AND '50-15, EB-8, PB-15' MANAGEMENTS, 1976.

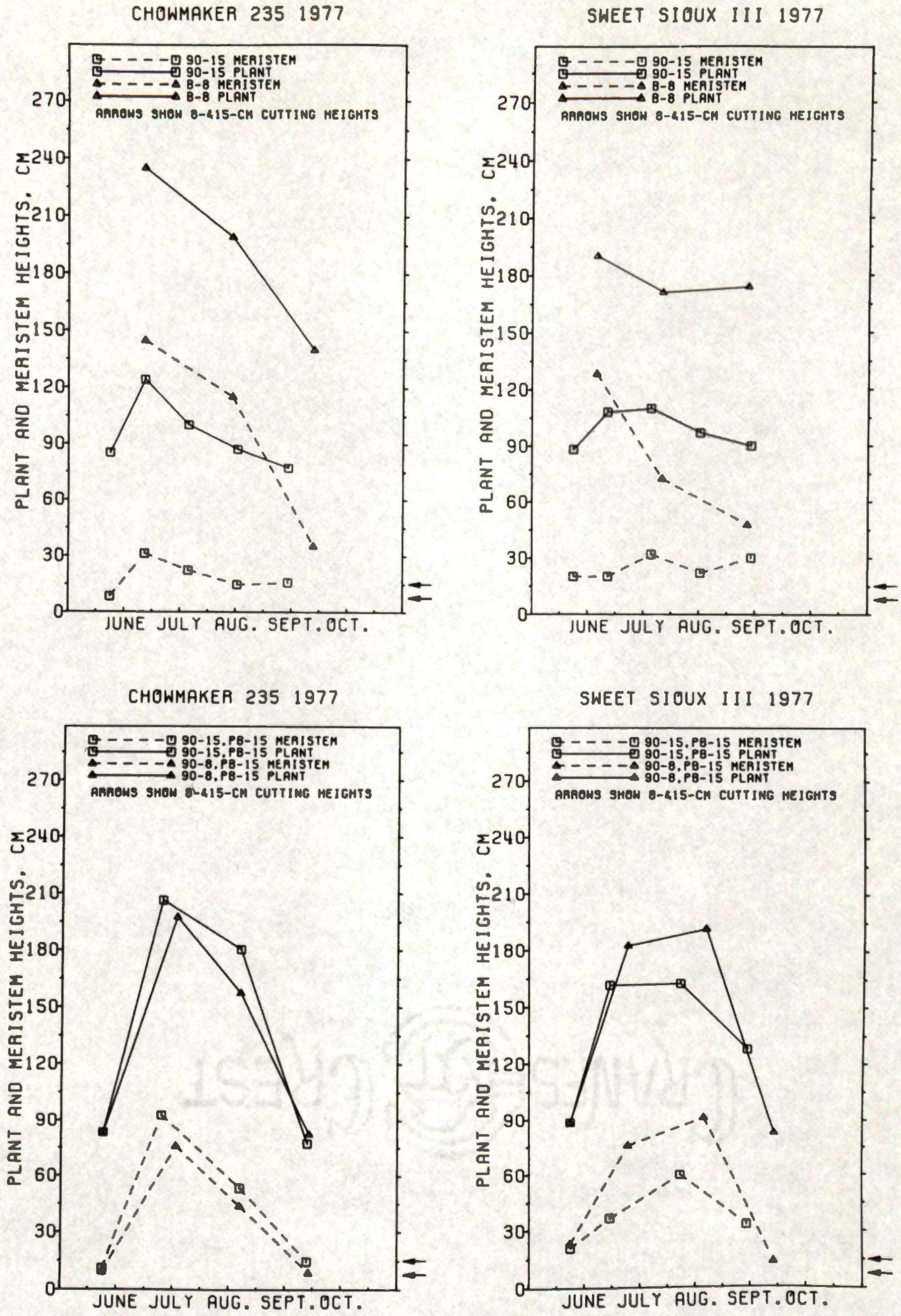

FIGURE XI. PLANT AND MERISTEM HEIGHTS OF CHOWMAKER AND SWEET SIOUX SUBJECTED TO THE '90-15' AND 'B-8' MANAGEMENTS, 1977.

TABLE III

SKEWNESS AND KURTOSIS OF DISTRIBUTIONS OF MERISTEM HEIGHTS OF FOUR SUMMER ANNUAL GRASSES SUBJECTED TO DIFFERENT MANAGEMENTS, 1976-1977 (671 SAMPLES)

Skewness	Percent	Kurtosis	Percent
Primary Culm and Tiller Meristem Heights Above Ground			
-0.5 to +0.5	43.7	-0.5 to +0.5	47.2
-1.0 to +1.0	70.3	-1.0 to +1.0	66.9
-1.5 to +1.5	88.4	-1.5 to +1.5	78.1
-2.0 to +2.0	96.0	-2.0 to +2.0	84.2
0.0 to +2.0	91.2	-2.0 to +3.0	90.1
Axillary Tillers			
Meristem Lengths			
-0.5 to +0.5	26.8	-1.0 to +1.0	33.8
-1.0 to +1.0	42.9	-2.0 to +2.0	52.6
-1.5 to +1.5	67.4	-2.5 to +2.5	59.6
-2.0 to +2.0	86.4	-3.5 to +3.5	70.7
-2.0 to +2.5	95.1	-5.5 to +4.5	79.1
0.0 to +2.5	90.4	-5.5 to +5.5	86.4
Heights of Origin Above Ground			
-0.5 to +0.5	55.6	-1.0 to +1.0	60.2
-1.0 to +1.0	76.4	-1.5 to +1.5	72.3
-1.5 to +1.5	92.0	-2.0 to +2.0	77.2
-2.0 to +2.0	98.8	-3.0 to +3.0	87.2
0.0 to +2.0	88.1	-4.0 to +4.0	94.1

meristem heights refer to meristem heights from culms that originated at ground level. If a tiller originated as an adventitious bud above ground level, the distance of the meristem beginning from the point of origin on the stem was called the axillary tiller meristem length. The distance from the ground to the point of origin on the stem was called the height of origin above ground. Since a large proportion of the 671 samples, where both primary culm and tiller meristem heights were measured, had a skewness with an absolute value of less than 1.5 and a kurtosis with an absolute value of less than 2, it would seem that the data measured were distributed normally. However, the skewness range of 0.0 to +2.0 indicates that about 90% of the observations for the three morphological characteristics have values clustered to the left of the mean, with extreme values to the right of the mean. This indicates that more heights occurred below the mean of the characteristics than above it, or that primary culm and axillary tiller origins in fact occurred mostly below the mean heights listed. The skewness values of -1.0 to +1.0, which describe a relatively normal distribution, included 70% of meristem heights and 76% of axillary origins above ground. Thus, most of these were distributed almost normally, while many axillary tiller meristem heights were skewed to one side.

Kurtosis values indicate little flattening of distribution peaks. In fact 67% of meristem heights and 60% of axillary tiller origins occurred in the kurtosis range of -1.0 to +1.0. Only 34% of axillary tiller meristems occurred in the same range. Since a majority of the skewness and kurtosis values have an absolute value of 1.5, the data can be considered normally distributed.

The height of sorghum-sudangrass plants cut at PB in management 'PB-15' (Figure VII, p. 39) rose from the first to the second harvest, and then decreased. Meristem heights changed less than plant heights, but followed the same trend. The average plant height of Millhy plants cut at PB decreased from beginning to end of the season, while there was little change in average meristem height. The PB harvest succeeding the 90-15 harvest (Figure VIII, p. 40) was the highest of the plants cut at PB for the sorghum-sudangrass hybrids, then PB plants decreased in average plant height during the rest of the season. The graph of Millhy from the second harvest onward resembled the graph for management 'PB-15' in average plant and meristem height.

Average plant height in management 'B-8' (Figure IX, p. 41) ranged from about 255 cm to 150 cm for all cultivars, then decreased for all cultivars except Sweet Sioux which had a higher plant height for the second than for the first harvest. The curve for average meristem height was not parallel to plant heights for Millhy. Average meristem height decreased after the first harvest to 15 cm.

Average plant and meristem heights for the B stage of Sweet Sioux preceded by a 50-cm cut were lower than for plants in the B stage of management 'B-8' (Figure IX, p. 41). Plants of FS-531 had the same heights when cut at the B stage whether preceded by a 50-cm cut or not; the last harvest of management '50-15, B-8' was lower in height for both plants and meristems because of fewer days of growth. The first cut at the B stage for Millhy in management 'B-8' was higher than the first cut at the B stage in management '50-15, B-8', but during the rest of the season heights at the B stage were not different.

The data shown for the first two harvests of the managements illustrated in Figure X, p. 42, coincide because the managements were different only after the second harvest. The single harvests of Chowmaker and FS-531 plants after the EB cut in management '50-15, EB-8, PB-15' were over 2.5 m in height, and Sweet Sioux plants were about 2.1 m tall. Millhy plants had the lowest average plant and meristem heights. Sweet Sioux and Millhy were harvested at 130 or 120 cm instead of 75 cm for management '50-15, EB-8, 75-15', but Chowmaker and FS-531 were harvested close to 75 cm. The curve of average meristem height again mirrored the curve of average plant height, but it was below 15 cm after the second harvest in Chowmaker and FS-531.

In 1977, management 'B-8' (Figure XI, p. 43) had one more harvest than in 1976 for Chowmaker, but the plants in managements 'B-8' and '90-15, PB-8' were similar to those in 1976. Management '90-15' plants were harvested sometimes when higher than 90 cm.

Chowmaker plants harvested at PB, when preceded by a 90-15 or 90-8 cut, were not different in average plant or meristem height, but Sweet Sioux plants were lower in average plant and meristem heights when the PB was preceded by a 90-15 harvest rather than a 90-cm cut to 8-cm stubble.

VII. PREDICTIVE MODELS

Predictive models for yield at each harvest, regrowth per day (kg/ha/day), total N percent, and IVDMD were developed for the four cultivars (Table IV). Some variables such as average plant height

TABLE IV

PREDICTIVE MODELS FOR HARVESTED YIELD, REGROWTH RATE, TOTAL N CONTENT, AND *IN VITRO* DRY MATTER DIGESTIBILITY OF FOUR SUMMER ANNUAL GRASSES, 1976-1977

	Coefficients of Determination (R^2)
Yield at Each Harvest, kg/ha	
Chowmaker	
Chowmaker 235 = -1014.19 + 35.8749 Days regrowth + 29.9132 Ave. ht. + 263.1293 Total L.A.I. -0.9546 Previous stubble yield	.918
Sweet Sioux III	
Sweet Sioux III = -3201.26 + 20.7623 Clim. day + 2.2325 Days regrowth + 61.6586 Ave. ht. -2.8148 Cumul. precip. -7.4889 Regrowth deg. days -0.7824 Previous stubble yield	.921
FS-531	
FS-531 = 3023.90 -3.2147 Clim. day -37.2900 Days regrowth + 72.1384 Ave. ht. -133.1384 Above leaf %	.937
Millhy 99	
Millhy 99 = -2185.74 + 4.1734 Clim. day + 5.7624 Days regrowth + 30.1451 Ave. ht. + 0.7574 Regrowth deg. days + 875.8093 Previous L.A.I. below + 191.0998 Total L.A.I.	.937

TABLE IV (Continued)

	Coefficients of Determination (R^2)
Regrowth, kg/ha/day	
Chowmaker 235	
Chowmaker 235 = 54.7881 - 0.2564 Clim. day -0.5020 Days regrowth + 0.6016 Ave. ht. -4.2228 Previous total L.A.I. +13.2400 Total L.A.I.	.863
Sweet Sioux III	
Sweet Sioux III = 27.4841 + 0.1317 Clim. day -1.2263 Days regrowth +1.7547 Ave. ht. -0.3638 Regrowth deg. days -0.0201 Previous stubble yield	.874
FS-531	
FS-531 = -42.4134 + 0.8550 Clim. day -2.6133 Days regrowth + 1.5621 Ave. ht. -0.1872 Cumul. precip.	.893
Millhy 99	
Millhy 99 = -47.4775 + 0.1368 Clim. day -0.5527 Days regrowth + 0.8936 Ave. ht. -0.0522 Regrowth deg. days + 75.5986 Previous L.A.I. below	.880
Total N%	
Chowmaker 235	
Chowmaker 235 = 0.9724 + 0.0204 Clim. day -0.0619 Days regrowth -0.0031 Cumul. precip. + 0.0042 Regrowth precip. -3.0428 Previous L.A.I. below + 0.0278 Above leaf %	.830

TABLE IV (Continued)

	Coefficients of Determination (R^2)
Sweet Sioux III	
Sweet Sioux III = 1.4004 + 0.0164 Clim. day -0.0419 Days regrowth -0.0050 Ave. ht. -0.0020 Cumul. precip. + 0.0090 Cumulative deg. days -0.0010 Previous live culms -1.5983 Previous L.A.I. below + 0.0851 Total L.A.I. + 0.0194 Above leaf %	.807
FS-531	
FS-531 = 0.8551 + 0.0080 Clim. day -0.0252 Days regrowth + 0.6734 % N stubble	.808
Millhy 99	
Millhy 99 = 0.9826 + 0.0128 Clim. day -0.0205 Days regrowth -0.0032 Ave. ht. -0.0013 Cumul. precip. + 0.3472 % N stubble	.673
IVDMD	
Chowmaker 235	
Chowmaker 235 = 89.4092 + 0.0216 Clim. day -0.0723 Ave. ht. -0.0233 Cumul. precip.	.645
Sweet Sioux III	
Sweet Sioux III = 81.9481 + 0.0567 Clim. day + 0.0442 Ave. ht. -0.0226 Cumul precip. -0.0528 Regrowth deg. days + 0.3755 Previous total L.A.I.	.765

TABLE IV (Continued)

	Coefficients of Determination (R^2)
FS-531	
FS-531 = 85.1879 -0.0375 Days regrowth -0.0859 Ave. ht.	.90.
Millhy 99	
Millhy 99 = 96.4290 + 0.0509 Clim. day -0.0539 Cumul. precip. -10.9254 Previous L.A.I. below	.575

Abbreviations and units used:

Ave. ht. = Average height of plant in field, cm.
Clim. day = Climatic day, March 1 = Day 001.
Days regrowth = Elapsed days since previous harvest.
Regrowth deg. days = Regrowth degree days since previous harvest, base 15C, maximum allowed 35C.
Previous stubble yield = Yield below cut at previous harvest, kg/ha.
Regrowth precip. = Precipitation since previous harvest, mm.
Cumul. precip. = Precipitation since emergence, mm.
Total L.A.I. = Leaf area index of whole plant.
Above leaf % = % leaf dry weight in total yield.
Previous live culms = Live culms at previous harvest, n/m^2.
% N stubble = % N in stubble.
Cumulative deg. days = Degree days since planting, base 15C, maximum allowed 35C.
Previous L.A.I. below = Leaf area index of stubble at previous harvest.
Previous total L.A.I. = Leaf area index of whole plant at previous harvest.

or climatic day occurred in various combinations in many models; however, some of the variables appeared in only a few models and illustrated genotypic differences. Even though these variables do not necessarily reflect a cause and effect relationship, the statistical process used to isolate the independent variables significantly related jointly to the dependent variables, to the exclusion of non-significant effects, should be useful in determining those factors affecting the plant responses. Coefficients of determination (R^2) were high (> 0.80) for the most part, with only a few between .65 or .80. All partial regression coefficients presented in the models were significantly different from zero at $P \geq 0.05$.

Yields

The predictive models for yield at each harvest all had R^2 values above 0.90. Average plant height and number of days of regrowth occurred in all of the yield models and were associated with increases in yields, except that number of days of regrowth of FS-531 plants had a negative effect on yield.

Chowmaker yields were further increased as total L.A.I. increased, but were decreased as previous stubble yields increased.

Sweet Sioux yields also were larger as the season progressed (climatic day increased). The other variables in the Sweet Sioux yield model had negative coefficients, meaning that cumulative precipitation, regrowth degree days, and previous stubble yield were related to decreased harvested yields.

FS-531 had a simple model of four independent variables for harvested yield. In addition to average plant height and number of days of regrowth, climatic day and above leaf percent (the above cut portion that is leaves) occurred in the model and were related to decreases in harvested yield.

Millhy was different, since all independent variables had positive coefficients, indicating relationships that helped to increase harvested yields. Climatic day, regrowth degree days, previous L.A.I. of the stubble, and total L.A.I., in addition to average plant height and days regrowth, were present in the model for Millhy.

Regrowth

The models for daily regrowth had three variables in common: average plant height, climatic day, and number of days of regrowth. Average plant height and climatic day tended to increase daily regrowth for all cultivars except Chowmaker. In the case of Chowmaker, however, increasing number of days of regrowth tended to decrease regrowth per day.

The Chowmaker model had two additional variables, one which increased daily regrowth (total L.A.I.) and one which decreased daily regrowth (the previous total L.A.I.).

Regrowth degree days and previous stubble yield were two other variables that tended to decrease the daily regrowth rate for Sweet Sioux. FS-531 had daily regrowth further decreased by cumulative precipitation. Millhy also had two additional variables: regrowth days tended to decrease regrowth, but the previous L.A.I. of the stubble tended to increase regrowth for Millhy.

Total N Percent

Two variables were common to all the total N percent models. Total N percent tended to increase as climatic day increased, but number of days of regrowth tended to decrease total N percent. Cumulative precipitation also tended to decrease total N percent for models of all cultivars except FS-531. The number and type of additional variables present varied with genetic differences.

Above leaf percent and previous L.A.I. of the stubble were present in the models for Chowmaker and Sweet Sioux. Total N percent was apparently increased as above leaf percent increased, and decreased as the previous L.A.I. below cut increased. Rainfall appeared to be important for total N percent of Chowmaker plants, since regrowth precipitation occurred in the predictive model and increased total N percent.

The Sweet Sioux model included cumulative degree days and total L.A.I., and these were related to an increase in total N percent, but the number of previous live culms tended to decrease total N percent.

FS-531 had the simplest model, with only three variables. Millhy and FS-531 both had N percent of the stubble related to an increase in total N percent. Millhy total N percent decreased as average plant height increased.

IVDMD

The models for IVDMD were the simplest developed. Coefficients of determination ranged from .58 to .90. Climatic day increased IVDMD in all models except that for FS-531. Cumulative precipitation decreased IVDMD in all models where it occurred. Average plant height decreased

IVDMD in Chowmaker and FS-531 models but increased IVDMD in the model for Sweet Sioux.

FS-531 had only two variables (average plant height and number of days of regrowth), and they both decreased IVDMD.

Additional variables present in the model for Sweet Sioux were regrowth degree days, which decreased IVDMD, and previous total L.A.I., which increased IVDMD. The previous L.A.I. of the Millhy stubble decreased IVDMD.

Conclusions

As indicated by the high R^2 values, most of the models explained the data very well. Some variables such as average plant height, climatic day, and cumulative precipitation, were common to many of the models. In other years and places the models may differ because of environmental differences that may tend to favor certain variables. However, within the constraints established by the 1976-1977 environments at Knoxville, several general conclusions may be drawn.

Chowmaker yields, daily regrowth, N, and IVDMD appear to be related to rainfall, the number of days of regrowth and climatic day, average plant height, present or past leaf area of the total plant and the stubble's previous yield or leaf area. Also, above leaf percent occurred in the total N model.

The dependent variables for Sweet Sioux appear to be related to some of the same variables as Chowmaker, number of days of regrowth, yield of previous stubble, average plant height and climatic day.

But only cumulative precipitation seems to be related to the dependent variables instead of regrowth precipitation, and temperature appears to be related because either cumulative degree days or regrowth degree days appear in all the models. Other variables that occasionally occur are previous number of live culm, previous L.A.I. of stubble, total L.A.I. and previous total L.A.I.

Number of days of regrowth occurred in all the models for the dependent variables of FS-531 and appears to be significant for prediction of FS-531. Other related independent variables include climatic day and average plant height. Cumulative precipitation occurred in the regrowth model and above leaf percent in the yield model. Total N percent of the stubble is related to total N percent of the plant for both FS-531 and Millhy.

The pearlmillet, Millhy, dependent variables are also related to climatic day, the number of days of regrowth and average plant height. The leaf area of the stubble is related to all of the dependent variables except total N percent. Other related variables included regrowth degree days, cumulative precipitation and total L.A.I.

Generally, climatic day tended to increase all the dependent variables except the daily regrowth of Chowmaker; average plant height tended to increase yields and daily regrowth, but it decreased total N percent and IVDMD, except the IVDMD of Sweet Sioux. The other common variable, number of days of regrowth, tended to increase yields, except for FS-531, and decreased all the other dependent variables in the models where it occurred.

VII. GENERAL DISCUSSION

The quality and quantity of DM produced, and other variables measured, varied with year, management, and cultivar. There were greater differences in yields and morphological characteristics among cultivars for the sorghum-sudangrass hybrids than for the pearlmillet. In DM yield, the sorghum-sudangrass hybrids ranged from about 6000 kg/ha to about 30,000 kg/ha, whereas the pearlmillet ranged from 7000 kg/ha to about 13,000 kg/ha, only a 6000 kg/ha difference.

Generally, DM was greater when plants were harvested at taller or more mature stages; this is in agreement with the results of Beuerlein et al. (2), Burger et al. (4), and Wedin (28). However, insufficient data were obtained from FS-531 to determine whether it yielded more in the B than in the EB stage of growth.

In agreement with Burger et al. (4), no yield difference existed when 90-cm growth was cut to either 8-or 15-cm stubble in 1977. On the other hand, when the B or PB cut was preceded by a 90-cm harvest cut to 8-or 15-cm stubble, Chowmaker plants yielded more than Sweet Sioux plants when the previous 90-cm harvest was cut to 15 cm, and Sweet Sioux plants yielded more when the PB or B cut was preceded by a 90-cm harvest cut to 8 cm. The season yields of Chowmaker were also larger in management '90-15, B-8' than in '90-8, B-8'. Sweet Sioux season yields were greater in management '90-8, PB-15' than in '90-15, PB-15'. These results are different from those of Burger et al. (4).

All cultivars had similar quality and yield performance when harvested at or below 90 cm. At 90-cm harvests, season yields were around 10 metric tons for all cultivars. When the cultivars were harvested at later stages than 90-cm growth, differences among cultivars became apparent.

FS-531 was generally the highest yielding cultivar when allowed to reach the B or EB stages. If large amounts of DM of average quality are desired, then FS-531 could be managed '50-15, B-8' or '50-15, B-8, 75-15'.

Plants of FS-531 appeared to be slower in regrowth after harvesting than those of the other cultivars. The plants also had unusual tiller initiation growth. Tiller buds first grew horizontally along the ground then later curved upward toward a more vertical position. Culms of other cultivars grew almost vertically from the start of tiller initiation.

It was found that CP content and IVDMD decreased with each progressive advance in stage of maturity. This agrees with Sherrod et al. (22), but, in contrast to their results, CP levels were not less in regrowth material than in first growth material, as long as the plants were cut at the same continuous height or stage of growth throughout the season. This may be because Sherrod et al. (22) harvested plants in Hawaii at the heading or later stages of growth. The plants had an overall decrease in N percent as harvest continued over the season. Knoxville has a much shorter growing season than Hawaii with less time for regrowth, and most plants were harvested when at more immature stages than the heading stage. This may be why lower CP levels were not usually found in regrowth. Management '90-15' for Chowmaker in

1977 and management 'B-8' for Sweet Sioux in 1977 were the only ones where overall CP levels decreased over the season for harvests at a constant height or stage of growth.

N content and IVDMD were higher when plants were harvested at lower heights, or more frequently, than at taller heights. This agrees with the results of many others (4, 7, 11, 14, 16, 21, 22, 26, 28). Results similar to Burger et al. (4) were obtained for N percent for the first 90-cm harvest cut to 15 or 8 cm. The other harvests for managements '90-15' and '90-8' were not consistent in N percent. The material cut to 15-cm stubble was always higher in N percent than the material cut to 8-cm stubble in the first harvest.

In 1976 the first two-thirds of June were dry (Figure III, p. 29), and the end of July and August had rain that was well distributed. This helped regrowth. The latter parts of August and September were drier, resulting in good haymaking weather, but growth had also slowed. July was droughty in 1977, and August had mostly small showers which did not increase soil moisture very much. This may be another reason why N percent was lower in 1977 than in 1976. Moisture was adequate the rest of the year in 1977.

Chowmaker plants yielded more and had the same or higher N percent and the same IVDMD when cut to 15-cm stubble than when cut to 8 cm. Sweet Sioux plants, on the other hand, yielded more when stubble was 8 cm than when it was 15 cm. The N percent was about the same, and the IVDMD was not different with 8-or 15-cm stubble for Sweet Sioux. The pearlmillet slowed production in September and October due to its sensitivity to frost and cold (12, 19). It was observed that after some very cool nights, the leaves turned brown, and growth was not apparent in the field. This resulted in a shorter effective growing season for pearlmillet than for the sorghum-sudangrass hybrids. This observation agrees with those of Fribourg et al. (1975), Overton et al. (1972), and McCarter et al. (1977).

It was also difficult to maintain constant quality and large DM production of pearlmillet because the average plant height of physiologic stages of maturity decreased as the growing season progressed. This finally resulted in plants which, at the EB stage, had plant heights below 90 cm and sometimes below 50 cm.

Plants preceded by 50-cm or 90-cm harvests had responses that differed according to cultivar. The 50-cm cut previous to the B or EB cuts delayed harvest only for FS-531. The other cultivars reached the B or EB stages at the same time as plants cut at B or EB, whether that harvest was preceded by a 50-cm cut or not. If preceded by a 50-cm cut, the B or EB stages occurred at shorter heights for all cultivars, except FS-531. It is not known why this is so, but perhaps FS-531 plants are not as sensitive to daylength as the other cultivars. The 90-cm cut before the B or EB cuts delayed harvest for all cultivars, probably because all regrowth originated from axillary meristems. Most primary meristems had been removed; this may not have been the case in the 50-cm cuts, as indicated by average meristem and stubble heights (Figures VII and VIII, pp. 39, 40). The delayed harvests may be beneficial in helping to produce more DM later in the season when it may be more desirable or needed.

All cultivars had the highest quality when cut at 90 cm or below. Chowmaker plants seemed to perform best when cut at 90 cm or below, '90-15, PB-15' or when an EB harvest was preceded by a 50-cm cut. A stubble height of 15 cm for Chowmaker plants seemed important in maintaining high yields and quality.

An 8-cm stubble resulted in higher seasonal yields and sometimes higher quality for Sweet Sioux plants. The B or PB preceded by a 90-8 cm cut performed well. In 1976 the B or PB preceded by a 50-15 harvest had good quality and yields, but it is not known if 8-cm stubble would improve this. The higher rate of N applied in 1977 increased N content of Sweet Sioux in early summer.

FS-531 plants performed best when subjected to managements '50-15, B-8' or '50-15, B-8, 75-15'. This cultivar had high yields under these managements with fair quality and outyielded the other cultivars when allowed to reach the B or EB stages of growth. Plants subjected to a 90-15 cm harvest before a B harvest did not perform as well as plants managed '50-15, B-8'.

Millhy yield or quality were not affected by the managements studied. The 'PB-15' management, or any harvested before EB, was satisfactory. The higher rate of N applied in 1977 increased N content.

These results indicate that yield trials of many varieties give only limited information on the performance of a cultivar. Each sorghum-sudangrass cultivar performs better than other cultivars in terms of yield or quality, when subjected to specific managements, and these will vary with genotype response. An understanding of specific management applications for specific cultivars will help obtain better performance in the field in terms of yield and quality in the future.

CHAPTER IV

SUMMARY AND CONCLUSIONS

Sorghum-sudangrass hybrids and improved pearlmillets produce large amounts of forage in summer when most cool season forage crops have slowed production.

To determine some plant and environment characteristics and the extent of cultivar x management interaction over a broad spectrum of managements, four summer annual grass cultivars were subjected to 19 different defoliation frequency and stubble height managements at Knoxville, Tennessee in 1976 and 1977. The cultivars were Chowmaker 235, Sweet Sioux III, FS-531 sorghum-sudangrass hybrids and Millhy 99 pearlmillet. The plots were sidedressed with N twice during the summer and two samples were taken at each harvest, one large one to determine DM production, and a smaller one for determination of leaf area, dry weights of representative parts, meristem heights, N content and *in vitro* dry matter digestibility IIVDMD). Predictive models were developed for yield at each harvest, regrowth per day (kg/ha/day), total N percent and IVDMD.

Quality, morphological characteristics, and quantity of DM produced varied with year, management, and cultivar. The sorghum-sudangrass hybrids outyielded the pearlmillet when harvested later than the 90-cm height, but high quality and similar yields (10 metric tons/ha) were obtained when harvested at 90 cm.

When cut at 90 cm, stubble heights of 15-or 8-cm had no effect on yields or IVDMD, and resulted in similar N content. However, a 90-cm harvest cut to 15-or 8-cm stubble before a boot or early bloom harvest resulted in greater season yields for Chowmaker than for Sweet Sioux. Generally, Chowmaker performed best when cut to 15-cm stubble, and Sweet Sioux when cut to 8-cm stubble, when the stage of growth at harvest was earlier than the boot stage.

The pre-boot, boot or early bloom harvests were delayed by a previous 90-cm harvest for all cultivars, and N content sometimes was increased. A previous 50-15 cm harvest before an early bloom or boot harvest delayed the early bloom and boot harvests of FS-531, but did not delay those of the other sorghum-sudangrass hybrids and pearlmillet. These had greater N content as a consequence of the previous cut. The first pre-boot stage harvest of Sweet Sioux following a 50-15 cm harvest also had a larger N percent than the first pre-boot harvest of plants managed 'PB-15'. Material harvested at more mature or taller stages of growth were low in total N percent but relatively high in IVDMD.

The number of days since March 1, average plant height and the number of days during regrowth all were important predictors of harvested yields, daily regrowth, total N and IVDMD. These four dependent variables were increased as number of days since March 1 increased, except for the daily regrowth in the Chowmaker model. As average plant height at harvest increased, yields and daily regrowth increased, but N percent and IVDMD generally decreased. The number of days of regrowth generally increased yields and decreased all the other dependent variables.

Chowmaker plants performed best when growth before the boot stage was cut to 15-cm stubble. The performance of plants generally was related to rainfall, and many of the managements studied were suitable. Management '50-15, EB-8, 75-15' was favorable for quality and yield. Sweet Sioux plants performed best when growth was cut to 8 cm, and the dependent variables were related not only to the three independent variables listed above, but also cumulative rainfall and temperature.

The number of days of regrowth was related to all the dependent variables for FS-531. FS-531 plants yielded more than other cultivars when allowed to reach taller stages.

In addition to the number of days since March 1, the number of days for regrowth, and average plant height, leaf area of the stubble also were important in the Millhy models. This cultivar was not responsive to management.

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APPENDIX

TABLE V

HARVESTED YIELDS, ABOVE AND BELOW CUT YIELDS OF STEMS AND LEAVES, PERCENT IVDMD AND TOTAL N, AND SOME MORPHOLOGICAL CHARACTERISTICS OF CHOWMAKER 235 AT EACH HARVEST OF DIFFERENT MANAGEMENTS, YEAR 1976

DATE	ABOVE CUT YIELD, M2 SAMPLE	0.14 M2 SAMPLE: STEMS ABOVE CUT	STEMS BELOW CUT	LEAVES ABOVE CUT	LEAVES BELOW CUT	STEMS + LEAVES ABOVE CUT	STEMS + LEAVES BELOW CUT	YIELD ABOVE GROUND	PLANT HEIGHT	STEMS LIVE	STEMS DEAD	LIVE	IN-VITRO DRY MATTER DIGEST.	TOTAL NITROGEN ABOVE CUT	TOTAL NITROGEN BELOW CUT	LEAF AREA INDEX ABOVE CUT	LEAF AREA INDEX ABOVE GROUND	LEAF AREA INDEX BELOW CUT
	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	cm	n/m2	n/m2	%	%	%	%			
MGT 1: 50-CM GROWTH CUT TO 15-CM STUBBLE																		
11 JUNE	638	54	736	1155	142	1209	877	2086	.	159	0	100	81.3	2.43	2.29	2.42	2.72	0.30
18 JUNE	618	418	771	960	163	1378	935	2312	58	196	0	100	80.7	2.29	1.50	2.35	2.69	0.34
28 JUNE	815	344	1087	1557	86	1902	1173	3075	.	210	0	100	78.7	2.84	2.00	3.48	3.77	0.29
13 JULY	848	388	929	940	118	1328	1048	2375	61	151	32	81	77.4	2.25	1.05	2.18	2.24	0.06
28 JULY	666	147	951	492	83	639	1033	1672	52	140	32	81	77.6	2.13	0.64	1.18	1.26	0.08
9 AUG	252	151	1170	628	83	779	1252	2031	46	188	102	64	79.2	3.10	1.39	1.51	1.56	0.05
20 AUG	423	18	725	298	29	316	753	1069	50	151	102	59	83.0	3.60	1.72	0.61	0.67	0.06
30 AUG	400	83	954	484	22	567	976	1543	51	145	91	61	79.7	3.37	1.54	1.26	1.29	0.03
17 SEPT	507	111	911	309	29	420	940	1360	46	124	124	50	76.9	3.17	1.41	0.72	0.75	0.01
14 OCT	665	32	685	248	25	280	710	990	36	178	65	73	81.5	3.59	3.31	0.56	0.60	0.04
MGT 2: 90-CM GROWTH CUT TO 15-CM STUBBLE																		
16 JUNE	1571	456	908	1466	135	1921	1042	2964	90	194	0	100	77.3	2.28	.	3.46	3.76	0.30
2 JULY	1720	1507	1543	2375	323	3882	1866	5748	.	248	27	91	78.3	1.75	0.87	5.18	5.45	0.26
21 JULY	1551	800	1679	1589	126	2390	1805	4194	91	274	59	83	75.7	2.11	0.90	3.61	3.73	0.11
13 AUG	1815	657	1295	1048	29	1704	1324	3028	90	188	135	56	75.1	2.83	1.44	2.42	2.46	0.04
3 SEPT	1489	617	1823	1521	51	2138	1884	4022	77	339	167	67	74.8	2.77	1.65	3.47	3.54	0.07
19 OCT	2155	1069	2006	1790	29	2860	2034	4894	84	334	199	63	79.6	2.56	1.48	2.50	2.55	0.05
MGR 3: PRE-BOOT CUT TO 15-CM STUBBLE																		
30 JUNE	5807	3649	1202	3706	79	7355	1281	8636	171	145	0	100	.	1.43	0.52	7.25	7.31	0.06
17 AUG	6376	4130	2379	2885	65	7014	2443	9458	210	237	140	63	.	1.43	0.58	5.76	5.78	0.02
28 SEPT	2716	1191	1826	1388	47	2580	1873	4453	123	231	135	64	.	2.05	0.86	2.65	2.69	0.04
MGT 4: BOOT CUT TO 8-CM STUBBLE																		
19 JULY	16681	15646	1411	7028	60	22674	1471	24145	256	100	7	93	61.2	0.63	0.35	12.46	12.46	0.00
9 SEPT	7470	5016	1990	3069	12	8085	2002	10087	218	126	86	62	64.7	1.48	1.83	5.64	5.64	0.00
MGT 5: EARLY BLOOM CUT TO 8-CM STUBBLE																		
28 JULY	16784	17531	1582	5895	0	23426	1582	25008	281	97	5	95	62.6	0.53	0.29	9.44	9.44	0.00
28 SEPT	7396	8747	1356	3599	18	12346	1374	13720	236	161	70	70	.	1.13	0.74	6.89	6.89	0.00

TABLE V (Continued)

DATE	ABOVE CUT YIELD, M2 SAMPLE	0.14 M2 SAMPLE: STEMS ABOVE CUT	STEMS BELOW CUT	LEAVES ABOVE CUT	LEAVES BELOW CUT	STEMS + LEAVES ABOVE CUT	STEMS + LEAVES BELOW CUT	YIELD ABOVE GROUND	PLANT HEIGHT	STEMS LIVE	STEMS DEAD	LIVE	IN-VITRO DRY MATTER DIGEST.	TOTAL NITROGEN ABOVE CUT	TOTAL NITROGEN BELOW CUT	LEAF AREA INDEX ABOVE CUT	LEAF AREA INDEX ABOVE GROUND	LEAF AREA INDEX BELOW CUT
	kg/ha								cm	n/m²		%						
MGT 6: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN 90-CM CUT TO 15 CM																		
11 JUNE	771	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24 JUNE	1499	637	1512	1715	133	2352	1645	3997	87	210	0	100	75.8	2.87	1.94	4.58	4.78	0.20
13 JULY	2073	1012	1316	1273	189	2284	1505	3789	95	287	61	83	75.7	2.28	1.07	3.53	3.65	0.13
5 AUG	1759	570	1507	1066	68	1636	1575	3211	85	264	129	67	75.7	2.13	0.93	226	2.34	0.07
26 AUG	1681	387	1575	1080	86	1467	1661	3129	85	274	210	57	76.5	3.06	1.57	2.29	2.35	0.05
28 SEPT	2301	890	1833	1726	29	2616	1862	4478	91	242	86	74	76.6	2.36	1.19	3.42	3.45	0.03
MGT 7: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN 90 CM TO 15 CM ONCE, THEN 50 CM TO 15 CM, TWICE, THEN 75 CM TO 15 CM																		
11 JUNE	771	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24 JUNE	1499	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30 JUNE	271	344	858	940	122	1284	980	2264	44	280	27	91	.	2.84	2.11	2.34	2.53	0.18
13 JULY	600	161	1069	850	276	1012	1345	2357	58	280	59	82	.	2.22	0.96	2.22	2.36	0.14
30 JULY	1445	3839	1202	1970	61	5809	1263	7072	84	156	81	74	.	1.81	0.75	3.93	3.94	0.01
20 AUG	1082	298	1367	1048	25	1345	1392	2738	67	231	108	69	.	3.34	1.75	2.21	2.25	0.04
3 SEPT	994	427	1625	872	11	1299	1636	2935	67	178	124	60	.	3.24	1.65	2.70	2.73	0.02
12 OCT	1386	305	1338	897	61	1202	1399	2601	65	253	118	68	.	2.09	1.28	1.81	1.91	0.10
MGT 8: 90-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN PRE-BOOT CUT TO 15 CM																		
16 JUNE	1571	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
21 JULY	9083	5547	1744	2906	68	8453	1812	10265	195	113	59	67	67.0	0.99	0.34	5.70	5.70	0.00
1 SEPT	5103	3423	2124	2189	50	5612	2174	7786	178	167	81	67	70.3	1.50	0.94	5.14	5.16	0.01
19 OCT	1107	194	2443	915	93	1109	2537	3645	57	350	291	55	75.4	1.90	0.89	1.63	1.82	0.19
MGR 9: 50-CM GROWTH CUT TO 15-CM STUBBLE, PRE-BOOT CUT TO 15 CM, 50 CM CUT TO 15 CM, EACH ONCE, THEN 75 CM CUT TO 15 CM																		
11 JUNE	771	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
8 JULY	5348	3218	1033	2662	208	5881	1241	7122	168	135	0	100	.	1.33	0.64	5.39	5.47	0.09
23 JULY	612	266	1392	671	118	936	1511	2447	53	264	75	78	.	2.72	0.78	1.90	2.05	0.15
12 AUG	1346	588	1546	1173	11	1762	1557	3319	90	183	86	70	.	2.29	0.78	2.55	2.57	0.01
1 SEPT	1438	592	2293	1521	65	2113	2357	4471	76	366	188	66	.	2.94	1.33	3.43	3.55	0.12
12 OCT	2073	1223	1747	1521	22	2745	1769	4514	88	296	108	74	.	2.46	1.19	2.84	2.84	0.01
MGT 10: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN BOOT CUT TO 8 CM																		
11 JUNE	771	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19 JULY	11440	11571	1051	5737	29	17308	1080	18388	231	102	5	94	.	0.93	0.66	10.63	10.63	0.00
7 SEPT	6474	5683	1550	3240	18	8923	1568	10491	201	145	102	59	.	1.25	0.72	6.76	6.77	0.00

TABLE V (Continued)

DATE	ABOVE CUT YIELD, M^2 SAMPLE	0.14 M^2 SAMPLE: STEMS ABOVE CUT	STEMS BELOW CUT	LEAVES ABOVE CUT	LEAVES BELOW CUT	STEMS + LEAVES ABOVE CUT	STEMS + LEAVES BELOW CUT	YIELD ABOVE GROUND	PLANT HEIGHT	STEMS LIVE	STEMS DEAD	LIVE	IN-VITRO DRY MATTER DIGEST.	TOTAL NITROGEN ABOVE CUT	TOTAL NITROGEN BELOW CUT	LEAF AREA INDEX ABOVE CUT	LEAF AREA INDEX ABOVE GROUND	LEAF AREA INDEX BELOW CUT
	kg/ha								cm	n/m^2		%						
MGT 11: 50-CM GROWTH CUT 15-CM STUBBLE ONCE, BOOT CUT TO 8 CM ONCE, THEN 75 CM CUT TO 15 CM																		
11 JUNE	743	133	753	1342	124	1475	877	2352	.	205	0	100	.	2.43	2.06	2.90	3.21	0.31
19 JULY	11440	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17 AUG	1961	1241	1611	1959	65	3200	1676	4876	103	328	124	72	.	2.49	1.34	3.59	3.71	0.12
9 SEPT	1397	441	1306	994	36	1435	1342	2777	72	301	75	79	.	2.44	1.39	1.78	1.82	0.04
19 OCT	943	151	1618	736	72	886	1690	2576	50	296	280	52	.	2.33	1.24	1.30	1.47	0.16
MGT 12: 50-CM GROWTH CUT TO 15-CM STUBBLE TWICE, BOOT CUT TO 8 CM ONCE, THEN 75 CM CUT TO 15 CM																		
11 JUNE	771	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
18 JUNE	618	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2 AUG	10313	9171	1636	3287	32	12457	1668	14126	264	161	75	71	61.9	0.81	0.37	6.09	6.12	0.03
26 AUG	1389	481	1647	1381	65	1862	1711	3574	76	258	113	70	76.8	2.82	1.39	3.25	3.39	0.14
22 SEPT	1748	506	1884	1216	29	1722	1912	3635	74	280	161	64	77.1	2.65	1.36	2.61	2.64	0.03
MGT 13: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, EARLY BLOOM CUT TO 8 CM ONCE, THEN 75 CM CUT TO 15 CM																		
11 JUNE	771	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.		
28 JULY	13409	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20 AUG	1394	535	1475	1503	54	2038	1528	3566	72	269	86	75	.	3.02	1.86	3.38	3.50	0.12
9 SEPT	1819	624	1859	1428	36	2052	1894	3947	85	301	102	75	80.0	2.53	1.35	2.42	2.50	0.08
19 OCT	1087	169	1952	933	86	1102	2038	3139	49	457	156	74	.	2.91	1.51	1.65	1.82	0.17
MGT 14: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, EARLY BLOOM CUT TO 8 CM ONCE, THEN PRE-BOOT CUT TO 15 CM																		
11 JUNE	771	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28 JULY	13409	15769	1633	5145	0	20914	1633	22547	257	108	38	73	59.7	1.26	.	9.52	9.52	0.00
17 SEPT	6100	4248	2059	3043	57	7291	2117	9408	182	280	97	75	65.5	1.60	1.00	6.74	6.77	0.03
MGT 15: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, EARLY BLOOM CUT TO 8 CM ONCE, THEN BOOT CUT TO 8 CM																		
11 JUNE	933	63	628	1227	174	1290	802	2092	.	210	0	100	.	2.55	2.06	2.64	3.07	0.43
28 JULY	13409	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22 SEPT	8303	5009	1363	2461	11	7470	1374	8844	211	183	65	74	67.4	1.77	0.93	5.04	5.04	0.00

TABLE VI

HARVESTED YIELDS, ABOVE AND BELOW CUT YIELDS OF STEMS AND LEAVES, PERCENT IVDMD AND TOTAL N, AND SOME MORPHOLOGICAL CHARACTERISTICS OF CHOWMAKER 235 AT EACH HARVEST OF DIFFERENT MANAGEMENTS, YEAR 1977

DATE	ABOVE CUT YIELD, M² SAMPLE	0.14 M² SAMPLE: STEMS ABOVE CUT	STEMS BELOW CUT	LEAVES ABOVE CUT	LEAVES BELOW CUT	STEMS + LEAVES ABOVE CUT	STEMS + LEAVES BELOW CUT	YIELD ABOVE GROUND	PLANT HEIGHT	STEMS LIVE	STEMS DEAD	LIVE	IN-VITRO DRY MATTER DIGEST.	TOTAL NITROGEN ABOVE CUT	TOTAL NITROGEN BELOW CUT	LEAF AREA INDEX ABOVE CUT	LEAF AREA INDEX ABOVE GROUND	LEAF AREA INDEX BELOW CUT
	- - - kg/ha	- - -	- - -	- - -	- - -	- - -	- - -	- - -	cm	- n/m²	-	- - -	- - - %	- - -	- - -			
MGT 2: 90-CM GROWTH CUT TO 15-CM STUBBLE																		
16 JUNE	1685	280	499	1112	54	1392	553	1945	85	65	0	100	80.5	2.88	2.63	2.25	2.38	0.13
5 JULY	3114	1880	1093	1969	50	3849	1143	4992	124	136	7	94	81.6	2.44	1.93	4.51	4.58	0.07
29 JULY	1810	1055	1633	1672	25	2727	1658	4384	100	183	59	76	63.4	2.42	0.69	4.58	4.65	0.07
25 AUG	2972	843	1582	1374	14	2217	1597	3814	87	231	43	84	72.6	1.96	1.04	3.40	3.43	0.04
22 SEPT	992	316	1615	578	39	893	1654	2547	77	226	75	74	61.9	1.75	0.75	1.42	1.47	0.05
MGT 4: BOOT CUT TO 8-CM STUBBLE																		
5 JULY	10172	11751	703	7750	0	19501	703	20204	235	97	0	100	59.1	1.45	1.39	14.19	14.19	0.00
22 AUG	10205	8295	2350	4076	25	12371	2375	14747	199	129	54	70	68.3	1.16	0.58	9.23	9.23	0.00
6 OCT	3193	2192	1988	1582	57	3775	2045	5820	140	151	102	60	66.9	1.28	0.63	3.61	3.62	0.00
MGT 5: EARLY BLOOM CUT TO 8-CM STUBBLE																		
18 JULY	15999	16924	1374	6347	0	23272	1374	24646	262	86	0	100	67.5	1.09	0.83	11.54	11.54	0.00
9 SEPT	8493	6239	1798	2899	0	9139	1798	10936	222	129	48	73	49.2	1.23	0.64	5.98	5.98	0.00
6 OCT	646	538	1737	598	26	1136	1763	2899	51	187	54	76	58.4	1.81	0.80	1.40	1.44	0.04
MGT 8: 90-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN PRE-BOOT CUT TO 15 CM																		
16 JUNE	1661	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
18 JULY	8034	7531	1665	3771	0	11302	1665	12967	206	102	0	100	59.6	1.89	0.83	7.14	7.14	0.00
30 AUG	5154	3612	1880	2418	26	6030	1906	7937	180	165	47	78	66.4	1.40	0.77	4.19	4.21	0.02
6 OCT	1148	570	2666	929	65	1500	2730	4230	77	188	151	58	74.6	1.91	0.70	2.49	2.52	0.03
MGT 16: 90-CM GROWTH CUT TO 8-CM STUBBLE																		
16 JUNE	1708	337	420	1062	50	1399	470	1869	81	70	0	100	86.7	2.71	0.55	2.56	2.61	0.05
5 JULY	1999	1402	593	1689	24	3090	617	3708	99	161	0	100	79.5	2.75	1.84	3.81	3.82	0.01
1 AUG	3631	2873	1124	2526	0	5399	1124	6523	124	151	7	94	69.9	2.03	1.32	5.58	5.58	0.00
30 AUG	1622	1041	1755	1428	25	2469	1780	4248	92	183	70	72	75.1	2.07	0.85	2.96	2.97	0.02
7 OCT	1054	405	1223	649	18	1055	1241	2296	84	102	70	58	63.4	2.28	1.19	1.55	1.55	0.00
MGT 17: 90-CM GROWTH CUT TO 8-CM STUBBLE ONCE, THEN PRE-BOOT CUT TO 8 CM																		
16 JUNE	2010	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26 JULY	7993	7237	2289	4198	47	11435	2336	13771	197	156	0	100	71.8	1.06	0.28	8.40	8.43	0.02
30 AUG	3278	3023	2299	2521	55	5545	2354	7898	157	187	50	80	67.7	1.71	0.95	5.66	5.71	0.06
7 OCT	1038	201	1955	621	72	822	2027	2849	82	97	86	53	67.9	1.98	0.83	1.46	1.55	0.09

TABLE VI (Continued)

DATE	ABOVE CUT YIELD, M^2 SAMPLE	0.14 M^2 SAMPLE: STEMS ABOVE CUT	STEMS BELOW CUT	LEAVES ABOVE CUT	LEAVES BELOW CUT	STEMS + LEAVES ABOVE CUT	STEMS + LEAVES BELOW CUT	YIELD ABOVE GROUND	PLANT HEIGHT	STEMS LIVE	STEMS DEAD	LIVE	IN-VITRO DRY MATTER DIGEST.	TOTAL NITROGEN ABOVE CUT	TOTAL NITROGEN BELOW CUT	LEAF AREA INDEX ABOVE CUT	LEAF AREA INDEX ABOVE GROUND	LEAF AREA INDEX BELOW CUT
	kg/ha								cm	n/m²		%						
MGT 18: 90-CM GROWTH CUT TO 8-CM STUBBLE ONCE, THEN BOOT CUT TO 8 CM																		
16 JUNE	2313	879	509	1668	29	2547	538	3086	85	102	0	100	73.6	2.31	1.90	3.33	3.37	0.04
1 AUG	9895	11141	1342	4140	0	15281	1342	16623	221	129	16	90	67.9	1.15	0.81	7.93	7.93	0.00
20 SEPT	5241	3581	1816	1776	11	5357	1826	7183	198	118	54	67	62.1	1.01	0.62	4.11	4.11	0.00
MGT 19: 90-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN BOOT CUT TO 8 CM																		
16 JUNE	1636	703	886	1952	61	2655	947	3602	80	81	0	100	79.0	2.84	2.05	4.28	4.35	0.07
29 JULY	12246	6297	1274	3035	0	9332	1274	10606	235	108	0	100	70.3	1.54	1.20	6.36	6.36	0.00
20 SEPT	6848	6516	2515	2490	14	9006	2530	11535	216	140	48	78	65.4	1.13	0.70	5.48	5.48	0.00

TABLE VII

LEAF/STEM RATIO, CONTRIBUTIONS OF PLANT PARTS TO DRY MATTER PRODUCTION, AND CULM AND TILLER CHARACTERISTICS OF CHOWMAKER 235 AT EACH HARVEST OF DIFFERENT MANAGEMENTS, YEAR 1976

DATE	LEAF/STEM RATIO		DRY MATTER CONTRIBUTED BY				PRIMARY CULM AND TILLER MERISTEMS				AXILLARY TILLER MERISTEMS				AXILLARY TILLER ORIGINS			
	ABOVE CUT	BELOW CUT	ABOVE CUT		BELOW CUT		MEAN		MIN.	MAX.	MEAN		MIN.	MAX.	MEAN		MIN.	MAX.
			STEMS	LEAVES	STEMS	LEAVES	HEIGHT1/	NUMBER	HEIGHT	HEIGHT	HEIGHT	NUMBER	HEIGHT	HEIGHT	HEIGHT	NUMBER	HEIGHT	HEIGHT
			- - - - - - - %	- - - - - -			cm	n/m2	- - - - -	cm - - - - -		n/m2	- - - - -	cm - - - - -		n/m2	- - - cm - -	
MGT 1: 50-CM GROWTH CUT TO 15-CM STUBBLE																		
11 JUNE	40.05	0.21	2.4	54.2	36.2	7.1	1.6	14.8	0.6	4.0	.	0.0	.	.	.	0.0	.	.
18 JUNE	3.26	0.22	16.9	42.2	33.6	7.3	2.9	18.3	0.3	9.7	.	0.0	.	.	.	0.0	.	.
28 JUNE	4.71	0.07	11.1	50.9	35.5	2.5	3.3	19.5	0.4	9.8	.	0.0	.	.	.	0.0	.	.
13 JULY	2.66	0.12	15.7	39.4	39.8	5.1	6.6	14.0	0.2	24.5	0.3	1.5	0.3	0.3	5.5	1.5	4.1	6.4
28 JULY	3.27	0.08	8.6	28.1	58.4	4.9	5.1	13.0	0.1	15.5	1.3	1.0	1.3	1.3	2.5	1.0	2.1	2.1
9 AUG	10.46	0.08	7.3	30.8	75.0	2.5	3.9	22.0	0.3	13.5	0.8	7.5	0.5	1.5	4.0	7.5	0.8	10.0
20 AUG	16.25	0.03	1.7	27.9	68.1	2.3	2.4	14.0	0.2	7.5	0.3	2.0	0.3	0.3	3.0	2.0	2.6	3.6
30 AUG	5.53	0.02	5.5	29.7	63.5	1.2	5.8	13.5	0.6	11.3	2.0	7.0	0.6	5.0	4.5	7.0	1.5	7.5
17 SEPT	4.04	0.03	6.8	22.8	68.3	2.1	7.5	11.5	1.0	14.8	1.1	5.5	0.5	4.0	5.0	5.5	1.0	8.5
14 OCT	7.75	0.04	3.3	25.7	68.2	2.8	5.2	16.5	1.0	11.8	1.5	13.5	0.2	5.3	3.0	13.5	0.5	7.6
MGT 2: 90-CM GROWTH CUT TO 15-CM STUBBLE																		
16 JUNE	3.27	0.15	15.3	49.6	30.5	4.6	3.6	18.0	0.1	14.9	.	0.0	.	.	.	0.0	.	.
2 JULY	1.70	0.22	25.2	41.3	27.4	6.1	11.8	23.0	0.2	43.1	1.0	1.0	0.5	1.5	7.0	1.0	2.5	10.5
21 JULY	1.99	0.07	19.1	37.9	40.0	3.0	7.1	25.5	0.2	26.8	1.9	6.0	0.3	5.3	5.0	6.0	1.2	8.0
13 AUG	1.65	0.02	21.5	34.8	42.8	0.9	12.4	17.5	0.3	45.5	1.6	3.5	1.1	2.5	4.5	3.5	1.5	5.4
3 SEPT	2.47	0.03	15.3	37.9	45.2	1.5	9.1	31.5	0.5	24.5	2.1	19.0	0.5	10.8	6.0	19.0	0.5	14.8
19 OCT	1.92	0.01	20.7	36.8	41.7	0.7	13.0	31.0	0.2	40.0	7.2	9.0	0.3	26.3	4.0	9.0	1.0	8.0
MGT 3: PRE-BOOT CUT TO 15-CM STUBBLE																		
30 JUNE	1.01	0.06	42.2	42.8	14.1	0.9	35.2	13.5	0.3	93.3	.	0.0	.	.	.	0.0	.	.
17 AUG	0.72	0.02	43.3	30.6	25.5	0.7	45.4	22.0	0.3	141.1	83.9	1.5	16.4	135.2	9.0	1.5	3.8	17.0
28 SEPT	1.19	0.02	26.7	31.4	40.9	1.0	21.8	21.5	0.3	80.5	19.2	13.0	0.3	62.8	5.5	13.0	0.8	12.5
MGT 4: BOOT CUT TO 8-CM STUBBLE																		
19 JULY	0.46	0.04	63.8	29.2	6.6	0.3	143.8	9.3	42.5	221.5	.	0.0	.	.	.	0.0	.	.
9 SEPT	0.64	0.01	49.2	30.7	20.0	0.1	86.4	11.7	1.2	184.7	90.3	7.3	16.1	165.2	4.3	7.3	1.0	8.3
MGT 5: EARLY BLOOM CUT TO 8-CM STUBBLE																		
28 JULY	0.33	0.00	70.1	23.6	6.3	0.0	215.4	9.0	138.7	297.8	.	0.0	.	.	.	0.0	.	.
28 SEPT	0.44	0.01	62.1	26.9	11.0	0.1	89.4	15.0	0.8	204.5	27.8	2.5	0.8	80.5	2.0	2.5	1.0	2.8

TABLE VII (Continued)

DATE	LEAF/STEM RATIO ABOVE CUT	LEAF/STEM RATIO BELOW CUT	DRY MATTER CONTRIBUTED BY ABOVE CUT STEMS	ABOVE CUT LEAVES	BELOW CUT STEMS	BELOW CUT LEAVES	MEAN HEIGHT[1/]	PRIMARY CULM AND TILLER MERISTEMS NUMBER	MIN. HEIGHT	MAX. HEIGHT	AXILLARY TILLER MERISTEMS MEAN HEIGHT	NUMBER	MIN. HEIGHT	MAX. HEIGHT	AXILLARY TILLER ORIGINS MEAN HEIGHT	NUMBER	MIN. HEIGHT	MAX. HEIGHT
			- - - - - - - - %	- - - - - -			cm	n/m2	- - - - - - cm	- - - - - -	- - - - - -	n/m2	- - - - - - cm	- - - - - -	- - - - - -	n/m2	- - - cm - -	
MGT 6: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN 90-CM CUT TO 15 CM																		
11 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24 JUNE	2.92	0.10	15.9	43.6	37.1	3.4	5.5	19.5	0.4	22.0	.	0.0	.	.	.	0.0	.	.
13 JULY	1.41	0.14	26.8	33.5	34.7	5.0	7.5	26.7	0.2	33.7	0.5	3.0	0.3	0.8	5.0	3.0	1.3	9.6
5 AUG	3.45	0.04	12.7	26.8	41.9	1.8	8.8	26.0	0.1	42.3	3.1	12.0	0.3	12.6	5.5	12.0	1.5	12.3
26 AUG	2.88	0.06	11.8	33.7	51.1	3.3	5.2	25.5	0.2	19.6	3.6	12.0	0.6	15.5	2.5	12.0	0.5	6.6
28 SEPT	1.94	0.01	19.8	38.5	41.0	0.7	14.4	22.5	0.3	47.3	6.2	9.5	0.3	38.0	4.0	9.5	0.5	7.8
MGT 7: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN 90 CM TO 15 CM ONCE, THEN 50 CM TO 15 CM, TWICE, THEN 75 CM TO 15 CM																		
11 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30 JUNE	2.59	0.14	14.5	38.2	41.6	5.7	3.0	26.0	0.2	12.8	0.5	3.0	0.2	1.0	4.0	3.0	0.5	10.0
13 JULY	5.24	0.25	7.1	35.9	46.5	10.6	2.0	41.5	0.3	9.0	0.9	7.5	0.3	1.8	2.0	7.5	0.8	2.8
30 JULY	1.26	0.04	39.8	29.4	47.4	5.0	6.6	15.5	0.5	25.0	2.4	3.0	0.5	5.3	4.0	3.0	0.8	8.8
20 AUG	3.49	0.01	11.1	38.5	49.6	0.9	3.7	21.5	0.3	13.1	1.3	3.5	1.0	1.8	1.0	3.5	0.8	1.9
3 SEPT	2.11	0.00	14.4	29.7	55.6	0.4	11.4	16.5	0.8	24.3	5.9	6.5	1.5	13.5	3.0	6.5	0.8	7.3
12 OCT	2.98	0.04	11.9	34.5	51.2	2.4	6.9	23.5	0.2	41.5	1.8	8.5	0.5	5.0	3.5	8.5	0.5	8.3
MGT 8: 90-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN PRE-BOOT CUT TO 15 CM																		
16 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
21 JULY	0.53	0.04	53.5	28.4	17.4	0.7	87.5	10.5	0.2	188.3	.	0.0	.	.	.	0.0	.	.
1 SEPT	0.66	0.02	43.2	28.4	27.6	0.8	49.0	15.5	0.5	126.2	55.6	10.0	3.8	119.3	7.0	10.0	2.7	11.0
19 OCT	5.09	0.04	5.0	24.6	67.7	2.7	7.2	32.5	0.8	23.3	2.0	24.0	0.1	13.0	5.5	24.0	0.5	10.3
MGT 9: 50-CM GROWTH CUT TO 15-CM STUBBLE, PRE-BOOT CUT TO 15 CM, 50 CM CUT TO 15 CM, EACH ONCE, THEN 75 CM CUT TO 15 CM																		
11 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
8 JULY	0.82	0.20	44.8	37.2	15.0	3.0	32.9	12.5	0.3	103.0	.	0.0	.	.	.	0.0	.	.
23 JULY	2.67	0.08	10.8	27.4	57.0	4.8	3.8	24.5	0.2	29.5	1.2	10.5	0.3	2.4	4.5	10.5	1.2	14.8
12 AUG	2.00	0.01	17.8	35.8	46.1	0.4	8.7	17.0	0.6	39.9	9.6	3.5	1.3	26.0	2.0	3.5	1.3	3.3
1 SEPT	2.61	0.03	13.2	34.5	50.7	1.6	7.4	34.0	0.3	24.5	3.1	26.0	0.2	16.3	4.5	26.0	0.6	9.9
12 OCT	1.31	0.02	27.0	35.1	37.2	0.6	18.5	27.0	0.3	83.0	14.9	18.0	0.2	66.8	4.5	18.0	1.8	10.9
MGT 10: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN BOOT CUT TO 8 CM																		
11 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19 JULY	0.50	0.02	62.8	31.3	5.7	0.1	114.8	9.5	3.3	198.3	.	0.0	.	.	.	0.0	.	.
7 SEPT	0.57	0.01	54.2	30.9	14.8	0.2	80.5	13.5	0.2	191.7	85.9	7.0	17.6	184.9	4.5	7.0	1.5	8.3

TABLE VII (Continued)

DATE	LEAF/STEM RATIO ABOVE CUT	LEAF/STEM RATIO BELOW CUT	DRY MATTER CONTRIBUTED BY ABOVE CUT STEMS	DRY MATTER CONTRIBUTED BY ABOVE CUT LEAVES	DRY MATTER CONTRIBUTED BY BELOW CUT STEMS	DRY MATTER CONTRIBUTED BY BELOW CUT LEAVES	PRIMARY CULM AND TILLER MERISTEMS MEAN HEIGHT[1/]	PRIMARY CULM AND TILLER MERISTEMS NUMBER	PRIMARY CULM AND TILLER MERISTEMS MIN. HEIGHT	PRIMARY CULM AND TILLER MERISTEMS MAX. HEIGHT	AXILLARY TILLER MERISTEMS MEAN HEIGHT	AXILLARY TILLER MERISTEMS NUMBER	AXILLARY TILLER MERISTEMS MIN. HEIGHT	AXILLARY TILLER MERISTEMS MAX. HEIGHT	AXILLARY TILLER ORIGINS MEAN HEIGHT	AXILLARY TILLER ORIGINS NUMBER	AXILLARY TILLER ORIGINS MIN. HEIGHT	AXILLARY TILLER ORIGINS MAX. HEIGHT
			- - - - - - -	% - - - - - -			cm	n/m^2	- - - - - cm	- - - - -		n/m^2	- - - - - cm	- - - - -		n/m^2	- - - cm	- -
MGT 11: 50-CM GROWTH CUT 15-CM STUBBLE ONCE, BOOT CUT TO 8 CM ONCE, THEN 75 CM CUT TO 15 CM																		
11 JUNE	14.03	0.17	5.0	57.3	32.1	5.6	1.8	19.0	0.5	4.5	.	0.0	.	.	.	0.0	.	.
19 JULY	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17 AUG	1.57	0.03	25.3	39.8	33.6	1.3	12.9	30.5	0.2	64.7	10.0	11.0	0.3	58.9	2.0	11.0	0.0	5.2
9 SEPT	2.27	0.03	15.8	36.0	46.8	1.4	8.8	28.0	0.6	33.8	4.3	18.0	0.1	23.0	2.0	18.0	0.8	6.3
19 OCT	5.06	0.04	5.6	27.9	63.4	3.0	3.9	27.5	0.5	11.0	1.9	15.0	0.3	7.0	3.0	15.0	0.4	7.8
MGT 12: 50-CM GROWTH CUT TO 15-CM STUBBLE TWICE, BOOT CUT TO 8 CM ONCE, THEN 75 CM CUT TO 15 CM																		
11 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
18 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2 AUG	1.16	0.02	44.6	27.8	7.3	0.0	151.3	8.0	10.5	242.6	.	0.0	.	.	.	0.0	.	.
26 AUG	3.22	0.04	12.6	38.2	47.1	2.0	5.0	24.0	0.1	17.7	4.2	14.0	0.5	16.3	2.5	14.0	0.6	5.8
22 SEPT	2.57	0.01	13.7	33.5	52.0	0.8	9.1	26.0	0.5	29.0	6.3	21.5	0.3	27.8	3.5	21.5	0.5	7.5
MGT 13: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, EARLY BLOOM CUT TO 8 CM ONCE, THEN 75 CM CUT TO 15 CM																		
11 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28 JULY	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20 AUG	2.92	0.03	14.8	42.3	41.4	1.6	5.9	25.0	0.2	18.8	3.3	10.5	0.3	13.5	2.5	10.5	1.0	6.5
9 SEPT	2.50	0.02	15.3	36.0	47.8	0.9	9.0	28.0	0.2	33.3	6.8	9.0	0.3	19.1	2.5	9.0	0.5	4.3
19 OCT	6.01	0.04	5.3	29.7	62.2	2.8	4.5	42.5	0.3	18.3	1.8	32.5	0.2	15.0	3.5	32.5	0.4	9.9
MGT 14: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, EARLY BLOOM CUT TO 8 CM ONCE, THEN PRE-BOOT CUT TO 15 CM																		
11 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28 JULY	0.33	0.00	69.8	22.9	7.3	0.0	149.9	10.0	40.5	283.8	.	0.0	.	.	.	0.0	.	.
17 SEPT	0.73	0.02	44.8	32.6	22.0	0.6	48.1	26.0	0.3	151.8	32.0	12.0	0.8	132.8	3.5	12.0	0.8	6.5
MGT 15: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, EARLY BLOOM CUT TO 8 CM ONCE, THEN BOOT CUT TO 8 CM																		
11 JUNE	22.78	0.37	2.8	60.6	28.2	8.4	1.7	19.5	0.5	4.9	.	0.0	.	.	.	0.0	.	.
28 JULY	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22 SEPT	0.50	0.01	56.5	27.9	15.5	0.1	57.6	17.0	0.3	216.5	48.3	7.0	0.8	139.3	4.0	7.0	0.8	8.0

TABLE VIII

LEAF/STEM RATIO, CONTRIBUTIONS OF PLANT PARTS TO DRY MATTER PRODUCTION, AND CULM AND TILLER CHARACTERISTICS OF CHOWMAKER 235 AT EACH HARVEST OF DIFFERENT MANAGEMENTS, YEAR 1977

DATE	LEAF/STEM RATIO		DRY MATTER CONTRIBUTED BY				PRIMARY CULM AND TILLER MERISTEMS				AXILLARY TILLER MERISTEMS				AXILLARY TILLER ORIGINS			
	ABOVE CUT	BELOW CUT	ABOVE CUT		BELOW CUT		MEAN		MIN.	MAX.	MEAN		MIN.	MAX.	MEAN		MIN.	MAX.
			STEMS	LEAVES	STEMS	LEAVES	HEIGHT1/	NUMBER	HEIGHT	HEIGHT	HEIGHT	NUMBER	HEIGHT	HEIGHT	HEIGHT	NUMBER	HEIGHT	HEIGHT
			%				cm	n/m2	cm			n/m2	cm			n/m2	cm	
MGT 2: 90-CM GROWTH CUT TO 15-CM STUBBLE																		
16 JUNE	3.97	0.11	14.4	57.0	25.7	2.9	8.3	6.0	2.3	16.0	.	0.0	.	.	.	0.0	.	.
5 JULY	1.05	0.04	37.8	39.2	22.1	0.9	31.1	12.7	1.4	70.4	5.1	1.7	2.3	7.8	7.5	1.7	3.5	11.0
29 JULY	1.59	0.01	24.1	38.1	37.2	0.6	22.1	17.0	0.8	42.3	17.2	7.5	2.0	38.0	8.5	7.5	1.8	13.5
25 AUG	1.64	0.01	22.1	36.3	41.3	0.4	14.6	21.5	0.5	35.8	14.2	3.0	0.8	35.1	6.0	3.0	1.4	13.5
22 SEPT	2.09	0.02	12.6	22.8	63.0	1.6	15.7	21.0	5.3	30.3	7.2	16.0	2.5	22.7	9.5	16.0	2.8	17.4
MGT 4: BOOT CUT TO 8-CM STUBBLE																		
5 JULY	0.65	0.00	58.5	37.9	3.6	0.0	144.6	9.0	116.3	171.0	.	0.0	.	.	.	0.0	.	.
22 AUG	0.49	0.01	56.6	27.7	15.5	0.1	115.0	12.0	35.2	179.1	131.2	0.5	131.2	131.2	3.0	0.5	2.8	2.8
6 OCT	0.71	0.02	38.0	27.0	34.0	1.0	35.0	14.0	3.8	105.5	.	0.0	.	.	.	0.0	.	.
MGT 5: EARLY BLOOM CUT TO 8-CM STUBBLE																		
18 JULY	0.37	0.00	68.8	25.8	5.5	0.0	199.5	8.0	113.9	279.8	.	0.0	.	.	.	0.0	.	.
9 SEPT	0.46	0.00	57.0	26.6	16.4	0.0	73.9	8.0	23.3	139.4	92.1	8.5	1.4	200.3	4.5	4.5	2.1	6.8
6 OCT	1.27	0.02	17.9	20.5	60.6	1.0	3.8	17.3	0.6	13.2	1.4	7.7	0.8	2.0	7.3	7.7	4.3	12.0
MGT 8: 90-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN PRE-BOOT CUT TO 15 CM																		
16 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
18 JULY	0.50	0.00	58.0	29.0	12.9	0.0	92.6	9.5	14.8	164.0	22.5	1.5	21.0	24.0	23.0	1.5	21.3	23.8
30 AUG	0.67	0.01	45.8	29.9	23.9	0.4	53.1	15.3	0.7	141.2	0.8	1.3	0.8	0.8	12.3	1.3	12.0	12.0
6 OCT	1.62	0.02	13.5	21.8	63.2	1.5	14.6	17.5	4.0	35.0	7.2	8.0	2.5	15.5	7.5	8.0	2.8	13.3
MGT 16: 90-CM GROWTH CUT TO 8-CM STUBBLE																		
16 JUNE	3.29	0.12	18.5	56.8	22.0	2.6	8.1	6.5	2.3	13.3	.	0.0	.	.	.	0.0	.	.
5 JULY	1.29	0.03	36.9	47.3	15.5	0.4	16.2	15.0	0.7	42.1	8.3	1.3	6.8	9.8	10.0	1.3	8.8	12.0
1 AUG	1.02	0.00	42.6	43.0	14.4	0.0	30.8	14.0	1.2	75.9	28.9	1.7	21.1	36.1	6.5	1.7	5.2	7.7
30 AUG	1.44	0.01	23.3	32.9	43.3	0.6	12.5	17.0	0.5	39.8	5.8	2.5	0.5	22.8	3.0	2.5	1.3	7.5
7 OCT	1.59	0.01	18.2	28.6	52.5	0.6	12.3	9.5	3.0	29.5	14.1	2.0	6.0	31.0	4.0	2.0	2.0	6.0
MGT 17: 90-CM GROWTH CUT TO 8-CM STUBBLE ONCE, THEN PRE-BOOT CUT TO 8 CM																		
16 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26 JULY	0.58	0.02	52.7	30.5	16.5	0.3	75.6	14.5	0.3	166.8	101.0	0.5	101.0	101.0	2.0	0.5	2.0	2.0
30 AUG	0.89	0.02	37.0	32.0	30.3	0.8	43.5	17.3	0.5	93.9	41.4	4.7	24.5	64.8	9.0	4.7	5.7	12.7
7 OCT	3.16	0.03	7.0	21.9	68.5	2.6	8.7	9.0	1.0	24.3	3.1	2.5	0.8	6.3	2.5	2.5	2.0	3.3

TABLE VIII (Continued)

DATE	LEAF/STEM RATIO ABOVE CUT	LEAF/STEM RATIO BELOW CUT	DRY MATTER CONTRIBUTED BY ABOVE CUT STEMS	DRY MATTER CONTRIBUTED BY ABOVE CUT LEAVES	DRY MATTER CONTRIBUTED BY BELOW CUT STEMS	DRY MATTER CONTRIBUTED BY BELOW CUT LEAVES	PRIMARY CULM AND TILLER MERISTEMS MEAN HEIGHT1/	PRIMARY CULM AND TILLER MERISTEMS NUMBER	PRIMARY CULM AND TILLER MERISTEMS MIN. HEIGHT	PRIMARY CULM AND TILLER MERISTEMS MAX. HEIGHT	AXILLARY TILLER MERISTEMS MEAN HEIGHT	AXILLARY TILLER MERISTEMS NUMBER	AXILLARY TILLER MERISTEMS MIN. HEIGHT	AXILLARY TILLER MERISTEMS MAX. HEIGHT	AXILLARY TILLER ORIGINS MEAN HEIGHT	AXILLARY TILLER ORIGINS NUMBER	AXILLARY TILLER ORIGINS MIN. HEIGHT	AXILLARY TILLER ORIGINS MAX. HEIGHT
			%	%	%	%	cm	n/m2	cm	cm	cm	n/m2	cm	cm	cm	n/m2	cm	cm
MGT 18: 90-CM GROWTH CUT TO 8-CM STUBBLE ONCE, THEN BOOT CUT TO 8 CM																		
16 JUNE	1.91	0.05	28.4	54.3	16.4	0.9	10.0	9.5	0.2	27.0	.	0.0	.	.	.	0.0	.	.
1 AUG	0.39	0.00	65.9	25.6	8.4	0.0	115.6	12.0	14.8	193.2	20.2	0.5	20.2	20.2	25.0	0.5	24.6	24.6
20 SEPT	0.52	0.00	49.1	25.6	25.1	0.1	67.4	11.0	0.8	145.0	7.8	1.0	3.5	12.0	29.0	1.0	3.5	55.0
MGT 19: 90-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN BOOT CUT TO 8 CM																		
16 JUNE	2.77	0.07	19.5	54.2	24.7	1.7	13.4	7.5	1.8	23.1	.	0.0	.	.	.	0.0	.	.
29 JULY	0.48	0.00	59.4	28.7	11.9	0.0	83.2	10.0	8.5	203.8	35.8	1.0	35.8	35.8	7.0	1.0	6.8	6.8
20 SEPT	0.39	0.00	55.0	21.5	23.3	0.1	86.7	13.0	0.3	193.5	26.9	2.5	0.5	92.3	12.5	2.5	9.8	13.5

TABLE IX

HARVESTED YIELDS, ABOVE AND BELOW CUT YIELDS OF STEMS AND LEAVES, PERCENT IVDMD AND TOTAL N, AND SOME MORPHOLOGICAL CHARACTERISTICS OF MILLHY 99 AT EACH HARVEST OF DIFFERENT MANAGEMENTS, YEAR 1976

DATE	ABOVE CUT YIELD, M2 SAMPLE	0.14 M2 SAMPLE: STEMS ABOVE CUT	STEMS BELOW CUT	LEAVES ABOVE CUT	LEAVES BELOW CUT	STEMS + LEAVES ABOVE CUT	STEMS + LEAVES BELOW CUT	YIELD ABOVE GROUND	PLANT HEIGHT	STEMS LIVE	STEMS DEAD	LIVE	IN-VITRO DRY MATTER DIGEST.	TOTAL NITROGEN ABOVE CUT	TOTAL NITROGEN BELOW CUT	LEAF AREA INDEX ABOVE CUT	LEAF AREA INDEX ABOVE GROUND	LEAF AREA INDEX BELOW CUT
	- - - - -	- - - - -	- - - - -	kg/ha	- - - - -	- - - - -	- - - - -	- - - - -	cm	- n/m2 -	- n/m2 -	- - %	- - %	- - %	- - %			
MGT 1: 50-CM GROWTH CUT TO 15-CM STUBBLE																		
14 JUNE	1858	105	1069	1928	285	2033	1354	3267	66	441	0	100	81.9	2.23	1.94	3.98	4.61	0.63
21 JUNE	600	545	484	1073	187	1618	671	2289	53	463	0	100	68.5	2.47	2.11	1.96	2.26	0.31
30 JUNE	804	287	1177	800	154	1087	1331	2418	52	479	91	84	82.4	2.16	1.25	2.06	2.36	0.30
14 JULY	900	151	1299	700	452	850	1751	2601	50	328	145	69	81.2	1.86	0.99	1.64	2.01	0.37
26 JULY	815	154	1435	660	172	814	1607	2422	51	291	161	64	81.9	2.02	0.81	1.20	1.37	0.17
9 AUG	420	93	1356	452	136	545	1493	2038	50	441	248	62	83.0	2.46	1.13	0.83	1.01	0.18
23 AUG	925	280	2540	868	122	1148	2662	3810	50	387	571	42	84.2	3.27	1.54	1.75	1.88	0.12
9 SEPT	736	93	1119	251	50	344	1170	1514	46	258	323	47	.	2.67	1.62	0.50	0.57	0.06
14 OCT	313	323	1471	215	65	538	1536	2074	33	248	258	48	67.5	3.54	3.86	0.37	0.41	0.04
MGT 2: 90-CM GROWTH CUT TO 15-CM STUBBLE																		
21 JUNE	3070	1227	1411	2894	294	4121	1705	5827	86	481	0	100	80.4	1.97	1.03	6.31	6.87	0.56
16 JULY	2868	2289	1955	2339	391	4628	2347	6975	96	533	140	79	78.2	1.60	0.71	3.53	5.76	0.23
12 AUG	1889	725	2504	1432	222	2156	2727	4883	81	420	334	56	81.5	2.51	1.25	2.66	2.88	0.21
14 SEPT	2181	1371	1701	1213	129	2583	1830	4413	84	301	301	48	73.9	2.08	1.47	2.01	2.15	0.13
MGT 3: PRE-BOOT CUT TO 15-CM STUBBLE																		
28 JUNE	5228	3119	1229	3320	148	6439	1378	7817	.	366	0	100	.	1.75	0.90	4.42	4.65	0.23
26 JULY	2207	866	1849	1524	206	2390	2055	4444	88	348	147	70	.	1.58	0.64	3.10	3.31	0.21
20 AUG	1746	373	2174	1428	129	1801	2303	4105	78	431	269	62	.	2.63	1.64	2.62	2.77	0.15
3 SEPT	407	158	1873	294	93	452	1966	2418	49	398	323	56	.	3.38	1.55	0.80	0.92	0.11
14 OCT	577	502	1966	553	108	1055	2074	3129	45	334	387	47	.	2.19	1.94	0.89	0.99	0.11
MGT 4: BOOT CUT TO 8-CM STUBBLE																		
1 JULY	7566	6143	1141	4140	163	10283	1304	11587	145	474	0	100	72.5	1.11	0.52	8.44	8.49	0.05
9 AUG	1797	660	1112	1119	39	1780	1152	2931	88	194	156	53	80.8	1.72	0.94	2.04	2.04	0.01
3 SEPT	1261	402	825	631	14	1033	840	1873	60	183	151	55	76.9	3.18	1.68	1.39	1.45	0.06
14 OCT	487	825	1485	567	42	1392	1528	2921	36	312	226	58	78.4	2.75	1.72	0.96	0.99	0.02
MGT 5: EARLY BLOOM CUT TO 8-CM STUBBLE																		
8 JULY	9687	7294	1112	3337	233	10631	1345	11977	177	398	11	98	70.2	1.22	0.52	6.69	6.74	0.05
23 AUG	2906	2282	1478	1808	36	4090	1514	5604	97	312	258	54	76.4	2.16	1.07	3.05	3.06	0.01
14 OCT	584	737	1325	531	33	1268	1359	2626	44	237	230	51	68.4	3.03	1.08	0.91	0.94	0.03

TABLE IX (Continued)

DATE	ABOVE CUT YIELD, M2 SAMPLE	0.14 M2 SAMPLE STEMS ABOVE CUT	STEMS BELOW CUT	LEAVES ABOVE CUT	LEAVES BELOW CUT	STEMS + LEAVES ABOVE CUT	STEMS + LEAVES BELOW CUT	YIELD ABOVE GROUND	PLANT HEIGHT	STEMS LIVE	STEMS DEAD	LIVE	IN-VITRO DRY MATTER DIGEST.	TOTAL NITROGEN ABOVE CUT	TOTAL NITROGEN BELOW CUT	LEAF AREA INDEX ABOVE CUT	LEAF AREA INDEX ABOVE GROUND	LEAF AREA INDEX BELOW CUT
	- - -	- - -	- - -	- - -	kg/ha	- - -	- - -	- - -	cm	- n/m2 -		- - -	- - -	%	- - -			
MGT 6: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN 90-CM CUT TO 15 CM																		
14 JUNE	1719	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28 JUNE	2025	1231	1209	1801	176	3032	1385	4417	.	436	5	99	79.7	1.96	1.02	4.34	4.58	0.25
23 JULY	1983	980	1841	2016	179	2996	2020	5016	79	495	151	77	79.0	1.84	0.96	4.44	4.71	0.27
20 AUG	2268	1041	2347	1320	57	2361	2404	4765	85	355	355	50	80.7	2.69	1.52	2.27	2.37	0.10
14 OCT	1733	567	2081	560	108	1127	2189	3315	62	334	301	53	68.4	2.66	1.87	0.68	0.82	0.14
MGT 7: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN 90 CM TO 15 CM ONCE, THEN 50 CM TO 15 CM, TWICE, THEN 75 CM TO 15 CM																		
14 JUNE	1719	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28 JUNE	2025	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
14 JULY	1107	951	1206	825	477	1776	1683	3459	52	371	129	74	.	1.88	0.87	2.00	2.39	0.39
23 JULY	474	104	1493	520	248	624	1740	2364	46	398	145	73	.	2.40	0.93	1.10	1.34	0.23
12 AUG	1391	499	1406	757	158	1256	1564	2820	75	237	135	63	.	2.31	0.99	1.29	1.46	0.17
1 SEPT	1132	696	1823	997	208	1694	2031	3724	58	398	194	65	.	2.54	1.36	1.88	2.06	0.17
14 OCT	554	179	1794	280	43	459	1837	2296	41	215	269	44	.	3.09	4.65	0.44	0.47	0.02
MGT 8: 90-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN PRE-BOOT CUT TO 15 CM																		
21 JUNE	3070	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19 JULY	2108	2092	1475	1733	194	3825	1668	5493	97	339	102	78	75.0	1.38	0.54	3.58	3.76	0.17
17 AUG	2219	1180	1927	1356	129	2537	2056	4593	96	409	226	59	81.0	2.49	1.25	2.97	3.16	0.18
3 SEPT	615	373	1485	438	122	811	1607	2418	53	258	291	47	76.3	2.88	1.46	1.19	1.35	0.16
19 OCT	928	488	1808	474	29	962	1837	2799	53	205	517	27	72.4	2.38	1.23	0.62	0.65	0.02
MGT 9: 50-CM GROWTH CUT TO 15-CM STUBBLE, PRE-BOOT CUT TO 15 CM, 50 CM CUT TO 15 CM, EACH ONCE, THEN 75 CM TO 15 CM																		
14 JUNE	1719	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1 JULY	3258	2508	1439	2099	283	4607	1722	6329	104	420	0	100	.	1.55	0.87	4.41	4.69	0.28
21 JULY	1374	291	1604	1180	201	1471	1805	3276	57	447	151	75	.	1.61	0.78	2.75	2.94	0.18
17 AUG	2437	1450	2138	1457	169	2906	2307	5213	91	425	366	54	.	2.22	1.28	2.71	2.89	0.18
14 SEPT	1197	524	1751	682	151	1206	1902	3107	58	452	312	59	.	2.56	1.80	1.12	1.32	0.19
MGT 10: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN BOOT CUT TO 8 CM																		
14 JUNE	1719	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2 JULY	4056	3470	1098	3132	258	6602	1356	7958	.	457	11	98	.	1.84	1.01	6.73	6.88	0.14
12 AUG	2470	1536	1037	1353	11	2888	1048	3936	92	248	140	66	.	1.98	1.08	2.44	2.47	0.02
9 SEPT	887	538	1485	962	36	1500	1521	3021	57	420	452	46	.	2.56	1.38	1.01	1.07	0.05

TABLE IX (Continued)

DATE	ABOVE CUT YIELD, M2 SAMPLE	0.14 M2 SAMPLE: STEMS ABOVE CUT	STEMS BELOW CUT	LEAVES ABOVE CUT	LEAVES BELOW CUT	STEMS + LEAVES ABOVE CUT	STEMS + LEAVES BELOW CUT	YIELD ABOVE GROUND	PLANT HEIGHT	STEMS LIVE	STEMS DEAD	LIVE	IN-VITRO DRY MATTER DIGEST.	TOTAL NITROGEN ABOVE CUT	TOTAL NITROGEN BELOW CUT	LEAF AREA INDEX ABOVE CUT	LEAF AREA INDEX ABOVE GROUND	LEAF AREA INDEX BELOW CUT
	- - - kg/ha							- - -	cm	- n/m2 -		- - - %		- - -				
MGT 11: 50-CM GROWTH CUT 15-CM STUBBLE ONCE, BOOT CUT TO 8 CM ONCE, THEN 75 CM CUT TO 15 CM																		
14 JUNE	1686	4	1216	1579	398	1582	1615	3197	66	522	0	100	.	2.26	1.85	3.21	4.20	0.99
2 JULY	4056	.	.	.	.	.	.	.	.	.	.	.		.	.	.	.	.
9 AUG	2660	1223	1295	1224	111	2447	1406	3853	109	285	140	68	.	1.54	0.89	2.42	2.52	0.10
14 SEPT	2000	1643	1694	861	136	2504	1830	4334	77	312	280	54	.	2.24	1.44	1.33	1.39	0.06
MGT 12: 50-CM GROWTH CUT TO 15-CM STUBBLE TWICE, BOOT CUT TO 8 CM ONCE, THEN 75 CM CUT TO 15 CM																		
14 JUNE	1719	.	.	.	.	.	.											
21 JUNE	600	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9 JULY	2622	1833	879	1536	187	3369	1066	4435	90	414	22	95	80.4	1.58	0.79	3.63	3.67	0.04
5 AUG	1281	384	1335	1263	154	1647	1489	3136	72	344	188	64	83.7	1.81	0.91	2.45	2.65	0.21
30 AUG	1935	653	1119	1091	100	1744	1220	2964	69	269	205	55	80.5	2.49	1.57	2.01	2.15	0.12
19 OCT	943	545	1694	431	0	976	1694	2669	53	258	646	29	68.4	2.21	1.50	0.26	0.26	0.00
MGT 13: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, EARLY BLOOM CUT TO 8 CM ONCE, THEN 75 CM CUT TO 15 CM																		
14 JUNE	1719	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9 JULY	4897	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17 AUG	2926	1866	1306	1450	54	3315	1360	4675	114	344	97	84	.	1.90	1.17	2.32	2.34	0.02
17 SEPT	1581	1191	1600	1292	115	2483	1715	4198	62	431	226	66	.	2.24	1.38	2.50	2.60	0.09
MGT 14: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, EARLY BLOOM CUT TO 8 CM ONCE, THEN PRE-BOOT CUT TO 15 CM																		
14 JUNE	1719	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9 JULY	4897	2949	829	1460	208	4410	1037	5447	129	393	22	95	75.1	0.96	0.40	3.46	3.48	0.01
17 AUG	2117	1048	1275	1256	120	2303	1395	3698	95	269	204	57	80.4	2.25	1.40	2.07	2.25	0.17
1 SEPT	341	416	1299	474	50	890	1349	2239	41	323	194	64	79.7	2.97	1.76	1.18	1.31	0.12
19 OCT	685	373	1450	395	86	768	1536	2303	49	269	420	40	.	2.22	1.47	0.46	0.55	0.09
MGT 15: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, EARLY BLOOM CUT TO 8 CM ONCE, THEN BOOT CUT TO 8 CM																		
14 JUNE	1614	86	914	1636	225	1722	1139	2861	66	416	0	100	.	1.82	1.50	3.35	3.79	0.44
9 JULY	4897	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23 AUG	3705	3165	1586	2081	14	5246	1600	6846	103	258	291	45	76.7	2.39	0.99	3.83	3.84	0.01
19 OCT	838	380	703	230	0	610	703	1313	44	140	237	38	65.9	2.01	1.38	0.14	0.14	0.00

TABLE X

HARVESTED YIELDS, ABOVE AND BELOW CUT YIELDS OF STEMS AND LEAVES, PERCENT IVDMD AND TOTAL N, AND SOME MORPHOLOGICAL CHARACTERISTICS OF MILLHY 99 AT EACH HARVEST OF DIFFERENT MANAGEMENTS, YEAR 1977

DATE	ABOVE CUT YIELD, M^2 SAMPLE	0.14 M^2 SAMPLE: STEMS ABOVE CUT	STEMS BELOW CUT	LEAVES ABOVE CUT	LEAVES BELOW CUT	STEMS + LEAVES ABOVE CUT	STEMS + LEAVES BELOW CUT	YIELD ABOVE GROUND	PLANT HEIGHT	STEMS LIVE	STEMS DEAD	LIVE	IN-VITRO DRY MATTER DIGEST.	TOTAL NITROGEN ABOVE CUT	TOTAL NITROGEN BELOW CUT	LEAF AREA INDEX ABOVE CUT	LEAF AREA INDEX ABOVE GROUND	LEAF AREA INDEX BELOW CUT
	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	cm	n/m^2	n/m^2	%	%	%	%			
MGT 2: 90-CM GROWTH CUT TO 15-CM STUBBLE																		
21 JUNE	2922	897	829	1794	226	2691	1055	3746	93	307	0	100	69.9	3.06	1.71	4.70	5.23	0.53
8 JULY	2873	689	1030	1704	90	2393	1119	3513	84	307	27	92	74.4	2.78	1.86	3.98	4.14	0.16
4 AUG	2647	1744	1679	1575	75	3319	1755	5073	97	355	65	85	74.1	1.46	1.12	3.52	3.64	0.12
6 SEPT	2852	1545	2306	1268	124	2813	2430	5243	100	248	144	65	66.3	1.41	1.03	2.41	2.55	0.14
6 OCT	384	280	1564	337	118	617	1683	2300	47	188	226	47	65.4	2.01	1.18	0.64	0.75	0.11
MGT 5: EARLY BLOOM CUT TO 8-CM STUBBLE																		
29 JUNE	6854	5120	919	3940	93	9060	1012	10071	159	253	0	100	69.0	2.15	1.46	8.59	8.66	0.07
1 AUG	3727	2454	1360	2375	61	4829	1421	6250	123	248	0	100	67.5	1.66	1.08	4.90	4.92	0.01
6 SEPT	1482	1160	1459	1048	48	2208	1507	3715	85	276	169	66	62.8	1.88	0.93	1.81	1.86	0.05
6 OCT	350	165	983	273	7	438	990	1428	45	129	161	44	63.3	2.42	1.10	0.52	0.52	0.00

TABLE XI

LEAF/STEM RATIO, CONTRIBUTIONS OF PLANT PARTS TO DRY MATTER PRODUCTION, AND CULM AND TILLER CHARACTERISTICS OF MILLHY 99 AT EACH HARVEST OF DIFFERENT MANAGEMENTS, YEAR 1976

DATE	LEAF/STEM RATIO		DRY MATTER CONTRIBUTED BY				PRIMARY CULM AND TILLER MERISTEMS				AXILLARY TILLER MERISTEMS				AXILLARY TILLER ORIGINS			
	ABOVE CUT	BELOW CUT	ABOVE CUT STEMS	ABOVE CUT LEAVES	BELOW CUT STEMS	BELOW CUT LEAVES	MEAN HEIGHT1/	NUMBER	MIN. HEIGHT	MAX. HEIGHT	MEAN HEIGHT	NUMBER	MIN. HEIGHT	MAX. HEIGHT	MEAN HEIGHT	NUMBER	MIN. HEIGHT	MAX. HEIGHT
			- - - - - - - %	- - - - - -			cm	n/m2	- - - - - cm	- - - - -		n/m2	- - - - - cm	- - - - -		n/m2	- - - cm	- -
MGT 1: 50-CM GROWTH CUT TO 15-CM STUBBLE																		
14 JUNE	23.26	0.27	3.2	59.3	31.6	8.4	1.7	41.0	0.3	7.0	.	0.0	.	.	.	0.0	.	.
21 JUNE	3.46	0.40	19.2	44.3	27.0	9.5	4.5	43.0	0.2	18.6	.	0.0	.	.	.	0.0	.	.
30 JUNE	3.85	0.13	11.1	32.8	49.5	6.5	5.1	44.5	0.2	17.6	0.2	6.0	0.1	0.5	8.5	6.0	3.1	11.5
14 JULY	6.07	0.36	5.7	26.9	49.8	17.5	6.6	30.5	0.3	29.9	0.3	3.5	0.2	0.5	10.0	3.5	6.3	12.5
26 JULY	4.75	0.12	6.1	26.9	59.9	7.1	7.4	27.0	0.3	28.5	0.6	4.5	0.1	1.3	8.0	4.5	2.5	12.2
9 AUG	23.16	0.09	3.9	21.6	68.2	6.2	5.9	41.0	0.2	24.3	1.0	21.5	0.2	7.3	5.5	21.5	0.4	13.4
23 AUG	3.07	0.05	7.1	22.0	67.8	3.1	8.4	18.0	0.3	31.3	3.6	5.5	0.9	8.7	3.5	5.5	0.6	8.9
9 SEPT	2.71	0.05	6.0	16.3	73.8	3.9	9.6	12.0	0.8	26.0	4.9	7.5	0.3	18.0	5.0	7.5	0.8	10.8
14 OCT	0.94	0.04	13.8	10.5	72.4	3.3	16.0	11.5	2.5	43.0	5.9	8.0	0.6	28.5	6.0	8.0	1.0	12.5
MGT 2: 90-CM GROWTH CUT TO 15-CM STUBBLE																		
21 JUNE	2.55	0.21	20.7	49.7	24.4	5.2	12.1	44.7	0.2	46.5	.	0.0	.	.	.	0.0	.	.
16 JULY	1.06	0.20	32.7	33.7	28.1	5.5	21.6	49.5	0.2	111.0	1.3	9.5	0.3	7.0	9.5	9.5	3.8	14.8
12 AUG	2.10	0.09	14.5	29.4	51.6	4.5	14.4	39.0	0.2	56.0	5.8	10.5	0.2	23.3	7.0	10.5	0.6	13.4
14 SEPT	0.89	0.07	31.3	28.0	37.9	2.8	28.6	14.0	2.3	85.1	8.2	6.0	0.8	23.3	5.0	6.0	0.8	11.5
MGT 3: PRE-BOOT CUT TO 15-CM STUBBLE																		
28 JUNE	1.06	0.12	39.9	42.1	15.9	2.1	28.3	34.0	0.4	106.0	.	0.0	.	.	.	0.0	.	.
26 JULY	1.95	0.11	18.6	34.1	42.6	4.6	16.5	32.3	0.2	64.8	7.6	8.0	0.3	23.6	10.0	8.0	2.8	15.7
20 AUG	3.81	0.05	9.2	35.1	52.6	3.1	9.2	20.5	0.2	31.8	5.4	9.0	0.6	10.3	6.5	9.0	0.5	12.5
3 SEPT	1.98	0.05	6.4	12.0	77.8	3.8	11.0	18.5	1.5	37.3	3.5	9.0	0.8	20.8	5.5	9.0	1.5	11.5
14 OCT	4.55	0.06	12.9	17.3	66.0	3.8	20.7	15.5	6.0	36.0	14.4	10.0	1.8	30.3	5.0	10.0	0.8	10.5
MGT 4: BOOT CUT TO 8-CM STUBBLE																		
1 JULY	0.69	0.15	52.6	36.0	9.9	1.5	40.4	44.0	0.2	121.7	.	0.0	.	.	.	0.0	.	.
9 AUG	2.11	0.03	20.6	38.5	39.7	1.2	14.2	18.0	1.1	49.0	13.5	5.0	2.0	43.5	4.5	5.0	0.8	8.0
3 SEPT	1.58	0.02	21.5	33.7	44.1	0.8	13.9	8.5	0.5	41.8	3.0	2.0	1.5	4.5	1.5	2.0	1.0	1.5
14 OCT	0.82	0.03	23.5	16.9	58.1	1.5	16.8	14.5	0.8	54.8	5.8	9.0	0.2	21.0	4.5	9.0	2.6	9.0
MGT 5: EARLY BLOOM CUT TO 8-CM STUBBLE																		
8 JULY	0.49	0.22	59.6	28.8	9.5	2.2	43.6	37.0	0.2	167.6	.	0.0	.	.	.	0.0	.	.
23 AUG	0.77	0.02	40.7	31.5	27.2	0.6	31.7	14.5	0.8	89.5	45.9	2.5	6.7	74.0	3.0	2.5	1.0	5.0
14 OCT	1.46	0.03	24.7	19.9	54.1	1.3	19.3	11.0	1.3	59.5	16.8	6.0	0.5	43.0	2.5	6.0	0.8	5.0

TABLE XI (Continued)

DATE	LEAF/STEM RATIO ABOVE CUT	LEAF/STEM RATIO BELOW CUT	DRY MATTER CONTRIBUTED BY ABOVE CUT STEMS	DRY MATTER CONTRIBUTED BY ABOVE CUT LEAVES	DRY MATTER CONTRIBUTED BY BELOW CUT STEMS	DRY MATTER CONTRIBUTED BY BELOW CUT LEAVES	MEAN HEIGHT1/	PRIMARY CULM AND TILLER MERISTEMS NUMBER	PRIMARY CULM AND TILLER MERISTEMS MIN. HEIGHT	PRIMARY CULM AND TILLER MERISTEMS MAX. HEIGHT	AXILLARY TILLER MERISTEMS MEAN HEIGHT	AXILLARY TILLER MERISTEMS NUMBER	AXILLARY TILLER MERISTEMS MIN. HEIGHT	AXILLARY TILLER MERISTEMS MAX. HEIGHT	AXILLARY TILLER ORIGINS MEAN HEIGHT	AXILLARY TILLER ORIGINS NUMBER	AXILLARY TILLER ORIGINS MIN. HEIGHT	AXILLARY TILLER ORIGINS MAX. HEIGHT
			%	%	%	%	cm	n/m2	cm	cm	cm	n/m2	cm	cm	cm	n/m2	cm	cm
MGT 6: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN 90-CM CUT TO 15 CM																		
14 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28 JUNE	1.53	0.14	27.6	41.1	27.5	3.8	14.3	40.5	0.3	71.0	.	0.0	.	.	.	0.0	.	.
23 JULY	2.17	0.10	19.2	40.3	36.8	3.7	13.1	45.5	0.2	67.8	2.6	12.0	0.1	22.8	6.5	12.0	0.9	15.2
20 AUG	1.30	0.02	22.9	27.4	48.6	1.1	17.7	16.5	0.3	63.0	2.3	6.5	0.6	5.5	6.0	6.5	0.8	14.0
14 OCT	0.99	0.05	17.2	16.8	62.8	3.2	19.9	15.5	1.3	66.0	11.4	12.0	0.3	45.5	4.5	12.0	0.8	13.4
MGT 7: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN 90 CM TO 15 CM ONCE, THEN 50 CM TO 15 CM, TWICE, THEN 75 CM TO 15 CM																		
14 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
14 JULY	1.81	0.40	24.2	24.8	36.9	14.1	7.1	34.5	0.3	29.0	0.4	6.0	0.1	0.6	10.5	6.0	7.1	14.4
23 JULY	5.58	0.16	4.4	22.0	63.1	10.5	6.2	37.0	0.3	19.0	2.0	4.5	0.3	5.1	9.0	4.5	2.8	15.8
12 AUG	2.30	0.11	17.5	26.9	49.9	5.6	16.1	22.0	0.3	53.5	1.2	3.5	0.3	4.1	5.5	3.5	2.9	7.1
1 SEPT	1.58	0.11	15.9	23.9	54.3	5.8	13.6	18.5	0.1	38.8	4.6	7.5	0.8	13.3	10.0	7.5	5.5	14.5
14 OCT	1.67	0.02	7.8	12.2	78.0	1.9	14.5	10.0	2.3	30.0	6.8	5.5	0.5	16.3	5.5	5.5	1.0	11.0
MGT 8: 90-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN PRE-BOOT CUT TO 15 CM																		
21 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19 JULY	0.89	0.13	37.8	31.6	27.0	3.6	28.6	31.5	0.1	134.5	1.3	3.0	0.5	3.5	6.5	3.0	3.8	9.8
17 AUG	1.24	0.06	25.9	29.5	41.8	2.8	19.4	38.0	0.2	76.9	8.7	13.5	0.2	54.2	6.5	13.5	1.2	13.6
3 SEPT	1.21	0.09	15.7	18.1	61.0	5.2	16.2	12.0	2.0	53.0	1.3	5.0	0.5	2.0	8.0	5.0	1.8	12.8
19 OCT	1.54	0.01	16.0	17.1	66.1	0.9	22.5	9.5	3.3	46.0	5.6	1.5	5.5	5.8	3.5	1.5	2.3	4.3
MGT 9: 50-CM GROWTH CUT TO 15-CM STUBBLE, PRE-BOOT CUT TO 15 CM, 50 CM CUT TO 15 CM, EACH ONCE, THEN 75 CM CUT TO 15 CM																		
14 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1 JULY	0.87	0.20	39.0	33.5	23.0	4.5	27.2	39.0	0.2	87.3	.	0.0	.	.	.	0.0	.	.
21 JULY	4.34	0.13	8.9	36.0	49.0	6.1	6.7	41.5	0.2	37.5	0.9	13.5	0.2	3.0	7.5	13.5	2.4	13.5
17 AUG	1.02	0.08	27.8	28.0	41.0	3.2	19.7	39.5	0.1	101.5	11.4	10.5	0.2	42.0	7.0	10.5	1.4	12.0
14 SEPT	1.59	0.08	15.1	21.3	59.1	4.5	13.1	21.0	0.3	44.3	7.2	12.5	0.1	25.0	6.5	12.5	1.0	13.3
MGT 10: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN BOOT CUT TO 8 CM																		
14 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2 JULY	0.90	0.24	43.7	39.2	13.8	3.3	24.9	42.5	0.2	99.5	.	0.0	.	.	.	0.0	.	.
12 AUG	0.92	0.01	38.6	34.4	26.8	0.3	27.3	23.0	0.4	102.6	3.3	6.0	0.3	14.0	4.0	6.0	0.6	7.7
9 SEPT	2.11	0.02	15.8	29.8	53.1	1.4	11.3	19.5	0.6	38.1	3.4	8.5	0.6	15.8	3.5	8.5	0.5	7.4

TABLE XI (Continued)

DATE	LEAF/STEM RATIO ABOVE CUT	LEAF/STEM RATIO BELOW CUT	DRY MATTER CONTRIBUTED BY ABOVE CUT STEMS	DRY MATTER ABOVE CUT LEAVES	DRY MATTER BELOW CUT STEMS	DRY MATTER BELOW CUT LEAVES	PRIMARY CULM AND TILLER MERISTEMS MEAN HEIGHT1/	PRIMARY NUMBER	PRIMARY MIN. HEIGHT	PRIMARY MAX. HEIGHT	AXILLARY TILLER MERISTEMS MEAN HEIGHT	AXILLARY TILLER MERISTEMS NUMBER	AXILLARY TILLER MERISTEMS MIN. HEIGHT	AXILLARY TILLER MERISTEMS MAX. HEIGHT	AXILLARY TILLER ORIGINS MEAN HEIGHT	AXILLARY TILLER ORIGINS NUMBER	AXILLARY TILLER ORIGINS MIN. HEIGHT	AXILLARY TILLER ORIGINS MAX. HEIGHT
			%	%	%	%	cm	n/m2	cm	cm	cm	n/m2	cm	cm	cm	n/m2	cm	cm
MGT 11: 50-CM GROWTH CUT 15-CM STUBBLE ONCE, BOOT CUT TO 8 CM ONCE, THEN 75 CM CUT TO 15 CM																		
14 JUNE	213.0	0.32	0.1	49.6	37.9	6.0	1.6	48.5	0.3	6.3	.	0.0	.	.	.	0.0	.	.
2 JULY	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9 AUG	1.12	0.09	31.1	31.8	34.3	2.9	22.5	26.5	0.2	105.3	1.5	5.5	0.2	5.3	4.0	5.5	1.9	6.8
14 SEPT	0.54	0.08	38.0	20.8	38.0	3.2	26.4	14.5	0.2	88.0	2.8	3.5	0.2	8.1	5.0	3.5	1.3	10.3
MGT 12: 50-CM GROWTH CUT TO 15-CM STUBBLE TWICE, BOOT CUT TO 8 CM ONCE, THEN 75 CM CUT TO 15 CM																		
14 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
21 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9 JULY	0.85	0.21	41.2	34.7	19.9	4.1	19.4	38.5	0.1	83.0	.	0.0	.	.	.	0.0	.	.
5 AUG	3.36	0.11	12.1	40.6	42.5	4.8	8.6	32.0	0.2	66.9	0.6	7.0	0.2	1.5	4.5	7.0	0.8	8.3
30 AUG	1.91	0.09	21.4	37.0	38.2	3.4	20.6	12.5	3.3	51.3	11.8	4.5	3.3	23.8	6.0	4.5	3.3	7.8
19 OCT	0.79	0.00	20.4	16.1	63.4	0.0	25.1	12.0	0.2	46.0	.	0.0	.	.	.	0.0	.	.
MGT 13: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, EARLY BLOOM CUT TO 8 CM ONCE, THEN 75 CM CUT TO 15 CM																		
14 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9 JULY	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17 AUG	0.82	0.04	38.9	31.4	28.7	1.0	25.9	29.5	0.1	110.0	3.3	5.0	0.2	10.8	3.0	5.0	0.8	5.1
17 SEPT	1.26	0.07	27.1	31.6	38.7	2.6	17.3	20.0	0.3	79.0	7.0	14.5	0.2	33.0	5.0	14.5	1.5	12.8
MGT 14: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, EARLY BLOOM CUT TO 8 CM ONCE, THEN PRE-BOOT CUT TO 15 CM																		
14 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9 JULY	0.49	0.26	54.2	26.8	15.2	3.9	32.7	36.5	0.1	121.5	.	0.0	.	.	.	0.0	.	.
17 AUG	1.89	0.10	25.6	35.4	35.3	3.7	20.3	25.0	0.3	76.9	2.0	4.7	0.4	5.3	3.7	4.7	1.3	6.2
1 SEPT	1.66	0.04	18.3	21.2	58.2	2.2	11.6	15.0	0.3	41.8	0.9	7.5	0.5	2.5	4.0	7.5	0.5	10.8
19 OCT	1.05	0.06	16.3	17.0	62.9	3.8	18.1	12.5	1.6	43.3	11.1	7.0	1.5	27.3	4.0	7.0	1.3	7.5
MGT 15: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, EARLY BLOOM CUT TO 8 CM ONCE, THEN BOOT CUT TO 8 CM																		
14 JUNE	19.16	0.25	3.0	57.5	31.7	7.8	2.0	38.7	0.2	10.9	.	0.0	.	.	.	0.0	.	.
9 JULY	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23 AUG	0.75	0.00	43.1	31.2	25.6	0.1	44.5	12.0	10.0	119.3	8.3	2.5	5.8	15.3	8.0	2.5	6.8	9.8
19 OCT	0.58	0.00	28.9	16.9	54.2	0.0	26.4	6.5	9.8	46.5	12.3	2.5	10.3	15.0	4.5	2.5	1.0	10.3

TABLE XII

LEAF/STEM RATIO, CONTRIBUTIONS OF PLANT PARTS TO DRY MATTER PRODUCTION, AND CULM AND TILLER CHARACTERISTICS OF MILLHY 99 AT EACH HARVEST OF DIFFERENT MANAGEMENTS, YEAR 1977

DATE	LEAF/STEM RATIO		DRY MATTER CONTRIBUTED BY				PRIMARY CULM AND TILLER MERISTEMS				AXILLARY TILLER MERISTEMS				AXILLARY TILLER ORIGINS			
	ABOVE CUT	BELOW CUT	ABOVE CUT		BELOW CUT		MEAN		MIN.	MAX.	MEAN		MIN.	MAX.	MEAN		MIN.	MAX.
			STEMS	LEAVES	STEMS	LEAVES	HEIGHT[1/]	NUMBER	HEIGHT	HEIGHT	HEIGHT	NUMBER	HEIGHT	HEIGHT	HEIGHT	NUMBER	HEIGHT	HEIGHT
			%				cm	n/m^2	cm			n/m^2	cm			n/m^2	cm	
MGT 2: 90-CM GROWTH CUT TO 15-CM STUBBLE																		
21 JUNE	2.32	0.28	23.1	48.3	22.3	6.3	21.1	28.5	0.3	79.0	.	0.0	.	.	.	0.0	.	.
8 JULY	2.89	0.08	17.9	48.2	31.1	2.7	12.4	28.5	0.2	46.1	2.2	4.5	0.5	6.3	11.0	4.5	3.8	16.8
4 AUG	0.91	0.04	34.4	31.0	33.1	1.5	24.3	33.0	0.5	145.1	12.5	8.5	0.5	40.5	8.0	8.5	2.8	12.8
6 SEPT	0.81	0.07	29.2	23.6	44.2	3.0	27.6	23.0	0.5	95.2	2.7	8.0	0.4	10.0	8.0	8.0	4.1	11.8
6 OCT	1.30	0.07	12.2	14.6	68.0	5.1	16.9	17.5	3.8	40.5	4.4	5.5	0.8	11.3	8.0	5.5	3.3	12.3
MGT 5: EARLY BLOOM CUT TO 8-CM STUBBLE																		
29 JUNE	0.81	0.10	50.0	40.0	9.0	0.9	73.4	23.5	0.3	152.5	.	0.0	.	.	.	0.0	.	.
1 AUG	1.03	0.05	37.9	38.2	22.8	1.2	29.7	23.0	0.3	107.9	21.0	6.5	1.3	56.5	3.5	6.5	2.3	11.0
6 SEPT	0.93	0.03	31.2	28.1	39.5	1.2	16.9	25.7	0.4	83.0	2.9	5.7	1.4	9.9	4.3	5.7	3.5	6.1
6 OCT	1.64	0.00	11.6	19.2	68.7	0.5	7.4	12.0	0.3	36.5	4.4	2.5	1.0	7.8	5.0	2.5	3.5	6.3

TABLE XIII

HARVESTED YIELDS, ABOVE AND BELOW CUT YIELDS OF STEMS AND LEAVES, PERCENT IVDMD AND TOTAL N, AND SOME MORPHOLOGICAL CHARACTERISTICS OF SWEET SIOUX III AT EACH HARVEST OF DIFFERENT MANAGEMENTS, YEAR 1976

DATE	ABOVE CUT YIELD, M^2 SAMPLE	0.14 M^2 SAMPLE: STEMS ABOVE CUT	STEMS BELOW CUT	LEAVES ABOVE CUT	LEAVES BELOW CUT	STEMS + LEAVES ABOVE CUT	STEMS + LEAVES BELOW CUT	YIELD ABOVE GROUND	PLANT HEIGHT	STEMS LIVE	STEMS DEAD	LIVE	IN-VITRO DRY MATTER DIGEST.	TOTAL NITROGEN ABOVE CUT	TOTAL NITROGEN BELOW CUT	LEAF AREA INDEX ABOVE CUT	LEAF AREA INDEX ABOVE GROUND	LEAF AREA INDEX BELOW CUT
	- - - -	- - - -	- - - -	kg/ha	- - - -	- - - -	- - - -	- - - -	cm	- n/m²	-	- - -	- - %	- - -	- - -			
MGT 1: 50-CM GROWTH CUT TO 15-CM STUBBLE																		
11 JUNE	879	111	646	1130	176	1241	822	2063	.	248	0	100	81.9	2.29	2.00	2.35	2.93	0.58
18 JUNE	669	353	874	956	196	1310	1069	2379	58	307	0	100	78.5	2.20	1.47	2.18	2.76	0.58
28 JUNE	815	337	933	1313	90	1650	1023	2673	.	253	5	98	79.3	2.55	1.75	3.24	3.59	0.35
13 JULY	848	305	578	915	384	1220	962	2181	61	307	97	75	79.8	1.97	0.93	2.19	2.32	0.12
28 JULY	530	197	1543	631	154	829	1697	2526	53	339	205	62	76.4	2.22	0.96	1.66	1.71	0.05
9 AUG	392	79	1428	499	90	578	1518	2095	50	226	221	50	78.7	2.71	1.13	1.09	1.19	0.09
23 AUG	1156	172	944	606	65	779	1008	1787	63	151	124	55	80.5	3.29	1.60	1.37	1.44	0.07
7 SEPT	785	225	1275	969	60	1194	1335	2528	54	204	133	57	79.8	3.39	1.76	1.70	1.74	0.05
14 OCT	1699	764	1589	1055	54	1819	1643	3462	53	231	124	63	75.9	3.05	2.98	2.18	2.23	0.06
MGT 2: 90-CM GROWTH CUT TO 15-CM STUBBLE																		
16 JUNE	2686	1014	1141	1744	224	2757	1365	4123	95	312	0	100	.	.	.	4.26	4.81	0.55
2 JULY	1871	886	1446	1647	172	2533	1618	4151	.	307	65	83	80.0	2.22	1.25	4.22	4.40	0.18
21 JULY	1635	976	1641	1466	175	2442	1816	4258	96	255	140	65	78.1	2.25	0.99	2.84	2.97	0.14
12 AUG	1546	655	1854	1308	117	1964	1971	3935	81	294	301	50	76.8	2.60	1.44	3.81	3.97	0.16
1 SEPT	1397	706	1985	1363	48	2069	2033	4102	82	273	183	62	77.5	2.64	1.25	3.62	3.69	0.07
19 OCT	2637	1184	1579	1328	0	2512	1579	4090	84	285	188	65	75.2	1.97	0.89	2.04	2.04	0.00
MGT 3: PRE-BOOT CUT TO 15-CM STUBBLE																		
28 JUNE	8329	3383	1267	3136	169	6519	1435	7955	.	167	0	100	.	1.43	0.58	6.33	6.45	0.11
5 AUG	5009	2361	1320	1726	83	4087	1403	5490	184	151	108	59	.	1.22	0.52	3.54	3.56	0.02
14 SEPT	3972	1902	1981	1737	36	3638	2016	5655	140	253	172	60	.	1.86	0.83	3.64	3.65	0.01
MGT 4: BOOT CUT TO 8-CM STUBBLE																		
2 JULY	10192	9813	1163	5780	158	15593	1320	16914	.	205	0	100	71.4	1.28	0.61	11.76	11.79	0.03
20 AUG	8429	8658	1066	3764	4	12422	1069	13491	220	140	97	60	70.5	1.52	0.58	7.09	7.09	0.00
12 OCT	3160	1557	1826	1564	54	3122	1880	5002	110	296	124	70	75.2	1.71	0.96	2.74	2.79	0.04
MGT 5: EARLY BLOOM CUT TO 8-CM STUBBLE																		
12 JULY	15646	10211	822	3473	126	13685	947	14632	248	86	22	85	69.3	0.65	0.23	5.69	5.69	0.00
9 SEPT	9187	4772	1622	2325	22	7097	1643	8740	223	135	118	53	64.8	1.13	0.57	4.59	4.59	0.00

TABLE XIII (Continued)

DATE	ABOVE CUT YIELD, M2 SAMPLE	0.14 M2 SAMPLE: STEMS ABOVE CUT	STEMS BELOW CUT	LEAVES ABOVE CUT	LEAVES BELOW CUT	STEMS + LEAVES ABOVE CUT	STEMS + LEAVES BELOW CUT	YIELD ABOVE GROUND	PLANT HEIGHT	STEMS LIVE	STEMS DEAD	LIVE	IN-VITRO DRY MATTER DIGEST.	TOTAL NITROGEN ABOVE CUT	TOTAL NITROGEN BELOW CUT	LEAF AREA INDEX ABOVE CUT	LEAF AREA INDEX ABOVE GROUND	LEAF AREA INDEX BELOW CUT
	kg/ha								cm	n/m2		%						
MGT 6: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN 90-CM CUT TO 15 CM																		
11 JUNE	944	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24 JUNE	1727	470	1146	1125	179	1595	1326	2921	87	344	3	100	78.8	2.81	1.68	3.18	3.49	0.31
13 JULY	2309	1216	1317	1848	165	3064	1482	4546	91	301	81	79	76.3	2.11	1.32	4.45	4.65	0.20
2 AUG	1036	477	1525	1105	165	1582	1690	3272	77	307	199	61	74.9	2.13	1.14	2.41	2.70	0.29
26 AUG	2186	1252	1597	1740	104	2992	1701	4693	94	248	242	51	76.4	2.28	1.07	3.91	3.97	0.06
5 OCT	2527	588	1152	1195	36	1783	1188	2971	84	258	97	73	80.0	2.18	1.36	2.46	2.53	0.06
MGT 7: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN 90 CM TO 15 CM ONCE, THEN 50 CM TO 15 CM, TWICE, THEN 75 CM TO 15 CM																		
11 JUNE	944	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24 JUNE	1727	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30 JUNE	263	165	1105	466	154	631	1259	1891	41	549	97	85	.	2.58	1.55	1.24	1.59	0.35
13 JULY	902	151	951	1066	208	1216	1159	2375	56	317	75	81	.	2.25	1.10	2.03	2.22	0.19
30 JULY	1368	524	1163	958	194	1482	1356	2838	83	188	91	69	.	1.95	0.67	2.49	2.56	0.07
20 AUG	1199	608	1476	1397	62	2004	1538	3543	74	298	212	56	.	3.02	1.43	2.96	3.03	0.08
3 SEPT	1076	443	892	586	29	1029	921	1949	64	176	136	56	.	3.28	1.43	1.94	2.01	0.07
12 OCT	1719	1037	1837	1611	75	2648	1912	4560	62	296	161	64	.	2.19	1.27	2.85	2.95	0.09
MGT 8: 90-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN PRE-BOOT CUT TO 15 CM																		
16 JUNE	2686	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
21 JULY	7022	6419	1780	3416	147	9835	1927	11761	203	140	156	47	70.2	0.96	0.43	6.82	6.83	0.00
30 AUG	5543	3495	1952	2465	100	5960	2052	8012	173	242	221	51	72.4	1.74	0.92	5.06	5.13	0.07
19 OCT	1427	312	2020	987	90	1299	2110	3409	57	242	215	54	76.2	2.17	0.95	1.42	1.59	0.17
MGT 9: 50-CM GROWTH CUT TO 15-CM STUBBLE, PRE-BOOT CUT TO 15 CM, 50 CM CUT TO 15 CM, EACH ONCE, THEN 75 CM CUT TO 15 CM																		
11 JUNE	944	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1 JULY	3887	3491	1453	3333	104	6824	1557	8381	134	253	5	98	.	1.72	0.99	6.62	6.80	0.17
19 JULY	751	409	1258	1091	275	1500	1533	3033	63	294	97	76	.	2.22	1.18	2.68	2.85	0.17
5 AUG	1404	438	1292	922	100	1360	1392	2752	79	188	140	57	.	2.16	0.99	1.98	2.06	0.08
26 AUG	1838	377	1554	1012	72	1389	1625	3014	84	274	210	57	76.9	2.79	1.34	2.24	2.33	0.09
5 OCT	3257	1345	1615	1597	14	2942	1629	4571	93	307	108	74	.	2.24	1.01	2.74	2.76	0.03
MGT 10: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN BOOT CUT TO 8 CM																		
11 JUNE	944	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
8 JULY	7089	7815	1252	4815	118	12630	1371	14000	167	253	16	94	.	1.30	0.63	8.27	8.30	0.03
23 AUG	6704	3958	1432	2705	22	6663	1453	8116	189	226	145	62	.	1.76	0.70	5.47	5.47	0.00
12 OCT	2452	1263	1643	1902	39	3165	1683	4847	100	296	113	72	.	1.92	1.13	3.65	3.69	0.04

TABLE XIII (Continued)

DATE	ABOVE CUT YIELD, M² SAMPLE	0.14 M² SAMPLE: STEMS ABOVE CUT	STEMS BELOW CUT	LEAVES ABOVE CUT	LEAVES BELOW CUT	STEMS + LEAVES ABOVE CUT	STEMS + LEAVES BELOW CUT	YIELD ABOVE GROUND	PLANT HEIGHT	STEMS LIVE	STEMS DEAD	LIVE	IN-VITRO DRY MATTER DIGEST.	TOTAL NITROGEN ABOVE CUT	TOTAL NITROGEN BELOW CUT	LEAF AREA INDEX ABOVE CUT	LEAF AREA INDEX ABOVE GROUND	LEAF AREA INDEX BELOW CUT
	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	cm	n/m²	n/m²	%	%	%	%			
MGT 11: 50-CM GROWTH CUT 15-CM STUBBLE ONCE, BOOT CUT TO 8 CM ONCE, THEN 75 CM CUT TO 15 CM																		
11 JUNE	1084	149	721	1363	188	1512	910	2422	.	226	0	100	.	.	2.20	2.72	3.16	0.44
8 JULY	7089	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2 AUG	1586	535	1665	1198	122	1733	1787	3520	90	350	135	73	.	1.64	0.55	2.85	3.08	0.22
30 AUG	2721	1227	1442	1970	75	3197	1518	4715	99	210	145	60	.	2.54	1.13	4.31	4.37	0.06
19 OCT	2068	854	1866	1446	54	2300	1920	4219	72	371	269	57	.	2.19	1.13	2.32	2.40	0.07
MGT 12: 50-CM GROWTH CUT TO 15-CM STUBBLE TWICE, BOOT CUT TO 8 CM ONCE, THEN 75 CM CUT TO 15 CM																		
11 JUNE	944	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
18 JUNE	668	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19 JULY	6774	7058	725	3362	39	10419	764	11184	168	145	32	85	70.2	1.35	0.70	6.47	6.47	0.00
13 AUG	1140	746	1507	1579	93	2325	1600	3925	81	258	140	65	77.5	2.60	1.33	3.07	3.29	0.22
1 SEPT	1564	298	1471	1030	75	1328	1546	2874	70	366	145	71	78.3	2.85	1.59	2.82	2.98	0.16
12 OCT	2176	1421	1206	1327	22	2748	1227	3975	80	215	86	70	76.8	1.92	1.19	1.93	1.94	0.01
MGT 13: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, EARLY BLOOM CUT TO 8 CM ONCE, THEN 75 CM CUT TO 15 CM																		
11 JUNE	944	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
14 JULY	8934	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20 AUG	4052	2149	1507	1841	32	3990	1539	5529	142	199	97	65	.	1.82	0.88	3.69	3.74	0.05
17 SEPT	1420	520	1891	1170	39	1690	1930	3620	68	371	188	66	.	2.56	0.92	2.65	2.71	0.06
19 OCT	669	111	1808	664	79	775	1887	2662	36	398	210	66	.	2.73	1.10	0.92	1.06	0.13
MGT 14: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, EARLY BLOOM CUT TO 8 CM ONCE, THEN PRE-BOOT CUT TO 15 CM																		
11 JUNE	944	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
14 JULY	8934	8389	858	2849	165	11238	1023	12260	211	140	16	90	66.6	0.99	0.32	6.07	6.07	0.00
20 AUG	3552	2278	1267	1977	36	4255	1302	5558	137	215	108	67	72.7	1.94	0.95	3.38	3.42	0.04
12 OCT	3885	2684	2013	2418	61	5102	2074	7176	116	318	161	66	75.1	1.80	0.69	4.28	4.31	0.01
MGT 15: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, EARLY BLOOM CUT TO 8 CM ONCE, THEN BOOT CUT TO 8 CM																		
11 JUNE	869	111	789	1290	190	1401	980	2381	.	274	0	100	.	.	2.20	2.59	3.12	0.54
14 JULY	8934	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30 AUG	6742	6178	1345	3387	43	9566	1389	10954	196	221	118	65	65.1	1.76	0.61	6.56	6.56	0.00
19 OCT	1117	273	1428	911	72	1184	1500	2684	53	301	135	69	78.8	2.22	1.02	1.43	1.53	0.10

TABLE XIV

HARVESTED YIELDS, ABOVE AND BELOW CUT YIELDS OF STEMS AND LEAVES, PERCENT IVDMD AND TOTAL N, AND SOME MORPHOLOGICAL CHARACTERISTICS OF SWEET SIOUX III AT EACH HARVEST OF DIFFERENT MANAGEMENTS, YEAR 1977

	ABOVE CUT	0.14 M2 SAMPLE												IN-VITRO	TOTAL				
	YIELD,	STEMS		LEAVES		STEMS + LEAVES		YIELD	PLANT	STEMS			DRY	NITROGEN		LEAF AREA INDEX		
DATE	M^2 SAMPLE	ABOVE CUT	BELOW CUT	ABOVE CUT	BELOW CUT	ABOVE CUT	BELOW CUT	ABOVE GROUND	HEIGHT	LIVE	DEAD	LIVE	MATTER DIGEST.	ABOVE CUT	BELOW CUT	ABOVE CUT	ABOVE GROUND	BELOW CUT
	- - kg/ha - -								cm	- n/m^2 -		- - % - -						
MGT 2: 90-CM GROWTH CUT TO 15-CM STUBBLE																		
16 JUNE	1724	653	746	1564	79	2217	825	3043	88	97	0	100	76.6	2.33	1.64	3.55	3.68	0.13
5 JULY	2504	1356	753	1658	79	3014	832	3846	108	167	5	97	79.0	2.56	1.97	3.35	3.41	0.06
29 JULY	1897	1790	1410	2070	126	3861	1536	5396	110	135	48	73	70.2	2.68	1.53	5.59	5.74	0.14
25 AUG	2104	1220	1869	1546	18	2766	1887	4654	97	156	102	60	72.4	2.35	1.46	3.72	3.75	0.03
22 SEPT	1166	1044	1532	1091	32	2135	1564	3699	90	161	48	76	67.9	1.93	1.02	1.65	1.67	0.02
MGT 4: BOOT CUT TO 8-CM STUBBLE																		
29 JUNE	6412	5371	588	3462	90	8834	678	9512	190	86	0	100	63.8	2.33	1.18	7.44	7.45	0.01
4 AUG	8057	4837	858	2634	0	7470	858	8328	171	145	0	100	68.5	1.19	0.75	6.71	6.71	0.00
20 SEPT	4482	2336	1751	1600	25	3936	1776	5712	174	135	32	78	61.0	1.67	0.68	4.09	4.09	0.00
MGT 5: EARLY BLOOM CUT TO 8-CM STUBBLE																		
5 JULY	11233	8102	797	4884	0	12986	797	13783	218	151	0	100	61.6	2.50	0.92	11.06	11.06	0.00
22 AUG	11420	7858	1531	2791	0	10649	1531	12180	232	97	54	65	66.3	1.19	0.47	5.94	5.94	0.00
6 OCT	2719	1512	2069	1406	24	2918	2093	5011	120	140	140	51	59.0	1.58	0.56	2.96	2.96	0.00
MGT 8: 90-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN PRE-BOOT CUT TO 15 CM																		
16 JUNE	1850	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
8 JULY	5090	2641	1098	2174	57	4815	1155	5970	162	161	27	86	66.2	2.18	1.42	6.04	6.07	0.03
16 AUG	3329	4044	1819	2300	108	6344	1927	8270	163	102	32	81	63.9	1.16	0.51	5.35	5.37	0.02
22 SEPT	1917	1345	2225	1238	72	2583	2296	4880	128	140	59	72	69.4	1.58	0.64	1.97	1.97	0.00
MGT 16: 90-CM GROWTH CUT TO 8-CM STUBBLE																		
16 JUNE	1921	1277	617	2124	50	3401	667	4069	83	124	0	100	85.8	2.09	0.98	4.74	4.80	0.07
5 JULY	2381	2099	922	2490	43	4589	965	5554	104	334	32	92	69.3	3.09	1.99	7.15	7.17	0.01
1 AUG	2829	3143	1284	2931	0	6074	1284	7359	123	188	43	82	69.8	1.74	1.15	7.24	7.24	0.00
30 AUG	1220	758	880	1105	10	1863	890	2753	89	140	61	68	73.0	2.64	0.69	2.35	2.36	0.00
7 OCT	1409	614	1102	911	39	1525	1141	2666	84	167	151	53	58.0	2.00	0.99	2.04	2.04	0.00
MGT 17: 90-CM GROWTH CUT TO 8-CM STUBBLE ONCE, THEN PRE-BOOT CUT TO 8 CM																		
16 JUNE	2355	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
18 JULY	8104	8643	1403	3818	14	12461	1417	13878	183	140	16	89	65.2	1.61	0.82	7.19	7.20	0.00
30 AUG	5879	6810	2009	3714	72	10524	2081	12605	192	102	43	72	65.3	1.25	0.58	5.86	5.86	0.00
7 OCT	951	459	2074	865	25	1324	2099	3423	83	102	59	63	68.9	2.05	0.79	1.90	1.93	0.02

TABLE XIV (Continued)

DATE	ABOVE CUT YIELD, M^2 SAMPLE	0.14 M^2 SAMPLE: STEMS ABOVE CUT	STEMS BELOW CUT	LEAVES ABOVE CUT	LEAVES BELOW CUT	STEMS + LEAVES ABOVE CUT	STEMS + LEAVES BELOW CUT	YIELD ABOVE GROUND	PLANT HEIGHT	STEMS LIVE	STEMS DEAD	LIVE	IN-VITRO DRY MATTER DIGEST.	TOTAL NITROGEN ABOVE CUT	TOTAL NITROGEN BELOW CUT	LEAF AREA INDEX ABOVE CUT	LEAF AREA INDEX ABOVE GROUND	LEAF AREA INDEX BELOW CUT
	kg/ha								cm	n/m^2		%						
MGT 18: 90-CM GROWTH CUT TO 8-CM STUBBLE ONCE, THEN BOOT CUT TO 8 CM																		
16 JUNE	2789	1184	585	1805	54	2989	639	3627	98	102	0	100	84.3	2.24	1.25	4.02	4.08	0.05
18 JULY	7025	5335	743	2870	0	8206	743	8948	194	118	38	77	73.7	1.41	0.99	5.15	5.15	0.00
30 AUG	7537	4765	1973	2791	11	7556	1984	9540	191	140	91	63	64.2	1.53	0.63	5.18	5.18	0.00
7 OCT	1256	509	1593	822	14	1331	1607	2939	88	113	151	41	73.9	2.01	0.67	1.88	1.91	0.02
MGT 19: 90-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN BOOT CUT TO 8 CM																		
16 JUNE	1977	1208	844	1875	105	3083	950	4033	88	122	0	100	79.9	2.33	2.12	4.14	4.29	0.16
18 JULY	7514	4105	538	2465	0	6570	538	7108	188	113	16	88	75.3	1.16	0.63	4.87	4.87	0.00
30 AUG	7258	6358	1155	3053	7	9411	1162	10574	196	129	65	69	66.0	0.82	0.50	5.63	5.63	0.00
7 OCT	1120	746	1180	847	7	1593	1188	2781	86	140	108	58	67.1	1.81	0.82	2.08	2.08	0.00

TABLE XV

LEAF/STEM RATIO, CONTRIBUTIONS OF PLANT PARTS TO DRY MATTER PRODUCTION, AND CULM AND TILLER CHARACTERISTICS OF SWEET SIOUX III AT EACH HARVEST OF DIFFERENT MANAGEMENTS, YEAR 1976

DATE	LEAF/STEM RATIO		DRY MATTER CONTRIBUTED BY				PRIMARY CULM AND TILLER MERISTEMS				AXILLARY TILLER MERISTEMS				AXILLARY TILLER ORIGINS			
	ABOVE CUT	BELOW CUT	ABOVE CUT STEMS	ABOVE CUT LEAVES	BELOW CUT STEMS	BELOW CUT LEAVES	MEAN HEIGHT1/	NUMBER	MIN. HEIGHT	MAX. HEIGHT	MEAN HEIGHT	NUMBER	MIN. HEIGHT	MAX. HEIGHT	MEAN HEIGHT	NUMBER	MIN. HEIGHT	MAX. HEIGHT
			%	%	%	%	cm	n/m2	cm	cm	cm	n/m2	cm	cm	cm	n/m2	cm	cm
MGT 1: 50-CM GROWTH CUT TO 15-CM STUBBLE																		
11 JUNE	10.55	0.28	5.4	54.8	31.3	8.6	2.3	23.0	0.5	8.4	.	0.0	.	.	.	0.0	.	.
18 JUNE	2.77	0.43	15.6	41.9	33.6	8.9	4.2	28.5	0.1	17.2	.	0.0	.	.	.	0.0	.	.
28 JUNE	3.88	0.10	12.6	49.0	34.8	3.5	4.4	23.5	0.3	20.0	.	0.0	.	.	.	0.0	.	.
13 JULY	2.98	1.11	15.0	44.2	22.7	18.1	4.7	45.5	0.1	24.3	0.4	7.0	0.2	1.0	3.5	7.0	1.0	5.9
28 JULY	5.14	0.10	7.8	25.0	61.1	6.1	5.7	31.5	0.2	23.3	0.5	6.0	0.2	1.1	4.0	6.0	0.9	11.2
9 AUG	6.46	0.06	3.7	23.6	68.3	4.4	3.6	21.0	0.3	14.0	1.9	10.0	0.2	9.0	1.0	10.0	0.3	2.8
23 AUG	3.51	0.06	9.6	33.6	53.3	3.5	6.1	14.0	0.3	14.4	1.2	6.0	0.5	2.7	3.5	6.0	0.4	6.9
7 SEPT	4.44	0.05	8.0	34.8	54.4	2.7	6.2	19.0	0.3	16.2	3.7	3.3	1.7	6.7	2.7	3.3	1.3	4.0
14 OCT	1.38	0.03	22.1	30.4	45.9	1.5	18.3	21.5	0.6	58.3	12.8	10.5	0.3	30.5	2.0	10.5	0.5	3.4
MGT 2: 90-CM GROWTH CUT TO 15-CM STUBBLE																		
16 JUNE	2.25	0.20	22.3	43.3	28.6	5.8	4.6	29.0	0.1	17.1	.	0.0	.	.	.	0.0	.	.
2 JULY	1.84	0.12	21.2	39.3	35.5	4.0	8.2	28.0	0.1	34.7	2.0	1.5	1.0	4.0	9.0	1.5	4.0	12.0
21 JULY	1.56	0.10	22.7	34.5	38.8	4.0	12.3	23.7	0.2	40.8	3.4	3.0	0.4	11.5	4.3	3.0	1.7	6.8
12 AUG	2.08	0.06	16.5	33.2	47.3	2.9	7.8	27.3	0.2	33.7	3.3	7.3	0.4	10.1	3.7	7.3	0.8	7.7
1 SEPT	2.34	0.03	15.5	33.6	49.3	1.6	9.5	26.3	0.3	32.3	2.7	9.3	0.4	8.5	3.7	9.3	1.5	7.2
19 OCT	1.13	0.00	29.6	33.6	36.8	0.0	21.4	26.5	0.3	80.0	11.4	4.0	0.8	45.5	2.5	4.0	2.3	2.8
MGT 3: PRE-BOOT CUT TO 15-CM STUBBLE																		
28 JUNE	1.02	0.13	40.2	39.7	17.7	2.3	36.0	15.5	0.3	108.5	.	0.0	.	.	.	0.0	.	.
5 AUG	0.77	0.06	41.8	31.7	25.1	1.4	39.9	14.0	0.2	112.4	54.8	3.0	27.0	82.6	2.5	3.0	0.6	5.3
14 SEPT	0.91	0.02	33.4	30.6	35.2	0.8	28.3	23.5	0.2	94.0	20.0	10.5	0.3	66.3	5.5	10.5	0.8	11.0
MGT 4: BOOT CUT TO 8-CM STUBBLE																		
2 JULY	0.58	0.13	58.0	34.1	6.9	1.0	63.2	19.0	0.2	144.5	.	0.0	.	.	.	0.0	.	.
20 AUG	0.43	0.00	64.2	27.9	7.9	0.0	105.8	13.0	0.6	199.8	115.3	1.5	83.4	147.1	1.5	1.5	0.8	1.8
12 OCT	1.01	0.03	31.2	31.3	36.4	1.1	22.9	27.5	1.1	73.8	19.2	20.5	0.3	68.8	3.5	20.5	0.6	7.3
MGT 5: EARLY BLOOM CUT TO 8-CM STUBBLE																		
12 JULY	0.34	0.16	69.8	23.7	5.6	0.9	138.4	8.0	1.8	238.8	.	0.0	.	.	.	0.0	.	.
9 SEPT	0.51	0.01	54.2	26.9	18.7	0.2	91.0	12.5	5.1	210.7	93.4	7.5	5.3	209.2	2.0	7.5	0.4	6.2

TABLE XV (Continued)

DATE	LEAF/STEM RATIO		DRY MATTER CONTRIBUTED BY				PRIMARY CULM AND TILLER MERISTEMS				AXILLARY TILLER MERISTEMS				AXILLARY TILLER ORIGINS			
	ABOVE CUT	BELOW CUT	ABOVE CUT STEMS	ABOVE CUT LEAVES	BELOW CUT STEMS	BELOW CUT LEAVES	MEAN HEIGHT[1/]	NUMBER	MIN. HEIGHT	MAX. HEIGHT	MEAN HEIGHT	NUMBER	MIN. HEIGHT	MAX. HEIGHT	MEAN HEIGHT	NUMBER	MIN. HEIGHT	MAX. HEIGHT
			- - - - - - -	% - - - - -	-	-	cm	n/m2	- - - - -	cm - - - - -		n/m2	- - - - -	cm - - - - -		n/m2	- - -	cm - -
MGT 6: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN 90-CM CUT TO 15 CM																		
11 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24 JUNE	2.71	0.17	16.3	40.4	36.9	6.3	7.5	32.0	0.2	32.2	.	0.0	.	.	.	0.0	.	.
13 JULY	1.52	0.13	26.7	40.7	28.9	3.7	13.7	28.0	0.2	51.8	.	0.0	.	.	.	0.0	.	.
2 AUG	2.33	0.11	14.7	33.7	46.5	5.1	5.3	28.5	0.2	29.7	1.0	5.0	0.2	3.8	4.5	5.0	0.8	10.1
26 AUG	1.53	0.07	25.7	37.1	34.8	2.4	14.3	23.0	0.3	54.9	10.9	7.0	0.3	34.2	2.5	7.0	0.8	5.8
5 OCT	2.24	0.03	18.7	39.8	40.1	1.3	12.2	24.0	0.3	49.8	6.8	14.5	0.3	24.5	4.5	14.5	0.5	10.0
MGT 7: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN 90 CM TO 15 CM ONCE, THEN 50 CM TO 15 CM, TWICE, THEN 75 CM TO 15 CM																		
11 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30 JUNE	2.85	0.14	8.2	23.3	60.4	8.1	2.8	51.0	0.3	13.8	0.4	11.0	0.2	1.0	3.5	11.0	0.5	8.8
13 JULY	7.72	0.26	6.3	45.0	39.9	8.8	3.0	29.5	0.2	11.4	0.7	3.0	0.5	1.0	3.0	3.0	0.5	7.4
30 JULY	1.83	0.17	18.6	33.8	40.7	6.9	8.5	17.5	0.3	38.0	2.1	2.0	1.1	4.0	3.5	2.0	3.2	3.7
20 AUG	2.32	0.04	16.8	38.5	42.9	1.7	6.5	27.7	0.3	34.0	1.0	5.3	0.2	3.2	4.7	5.3	2.9	7.6
3 SEPT	3.84	0.07	25.3	28.7	44.4	1.6	7.3	16.3	0.6	17.3	2.2	5.0	1.0	4.8	4.0	5.0	2.8	5.2
12 OCT	1.63	0.04	21.7	34.4	42.4	1.5	15.5	27.5	0.5	58.5	2.4	3.5	1.0	4.5	3.0	3.5	1.0	4.8
MGT 8: 90-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN PRE-BOOT CUT TO 15 CM																		
16 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
21 JULY	0.53	0.08	54.5	29.0	15.1	1.3	90.0	13.0	0.2	179.5	.	0.0	.	.	.	0.0	.	.
30 AUG	0.70	0.04	43.7	30.8	24.2	1.2	50.9	22.5	1.8	156.2	19.6	10.5	0.6	90.3	13.5	10.5	1.1	58.6
19 OCT	3.39	0.05	8.9	29.5	58.6	2.9	8.2	22.5	0.3	18.6	4.7	15.0	0.5	12.0	3.0	15.0	0.5	9.5
MGT 9: 50-CM GROWTH CUT TO 15-CM STUBBLE, PRE-BOOT CUT TO 15 CM, 50 CM CUT TO 15 CM, EACH ONCE, THEN 75 CM CUT TO 15 CM																		
11 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1 JULY	0.95	0.07	41.7	39.7	17.4	1.2	27.7	23.5	0.2	93.3	.	0.0	.	.	.	0.0	.	.
19 JULY	3.27	0.21	11.7	34.9	44.3	9.0	5.4	27.3	0.2	20.6	1.3	8.3	0.3	3.9	5.0	8.3	0.9	9.7
5 AUG	2.86	0.09	13.7	32.8	49.0	4.5	8.1	17.5	0.2	26.5	7.0	2.5	0.8	16.3	5.5	2.5	2.5	8.5
26 AUG	2.80	0.04	12.1	33.4	52.1	2.4	7.1	25.5	0.3	29.9	5.4	13.0	0.5	25.4	4.0	13.0	0.7	8.5
5 OCT	1.19	0.01	29.4	34.9	35.3	0.3	21.8	28.5	0.3	86.0	12.1	17.5	0.1	68.3	6.0	17.5	0.8	12.4
MGT 10: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN BOOT CUT TO 8 CM																		
11 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
8 JULY	0.61	0.08	55.8	34.5	8.9	0.8	50.4	23.5	0.3	169.8	.	0.0	.	.	.	0.0	.	.
23 AUG	0.68	0.01	48.8	33.3	17.7	0.3	45.5	21.0	0.3	154.8	51.9	13.5	0.7	153.4	5.0	13.5	0.8	11.3
12 OCT	1.52	0.02	25.6	38.8	34.9	0.7	17.9	27.5	0.3	64.5	10.1	14.0	0.3	41.0	4.0	14.0	0.5	6.6

TABLE XV (Continued)

DATE	LEAF/STEM RATIO: ABOVE CUT	LEAF/STEM RATIO: BELOW CUT	DRY MATTER CONTRIBUTED BY: ABOVE CUT STEMS	DRY MATTER CONTRIBUTED BY: ABOVE CUT LEAVES	DRY MATTER CONTRIBUTED BY: BELOW CUT STEMS	DRY MATTER CONTRIBUTED BY: BELOW CUT LEAVES	PRIMARY CULM AND TILLER MERISTEMS: MEAN HEIGHT1/	PRIMARY CULM AND TILLER MERISTEMS: NUMBER	PRIMARY CULM AND TILLER MERISTEMS: MIN. HEIGHT	PRIMARY CULM AND TILLER MERISTEMS: MAX. HEIGHT	AXILLARY TILLER MERISTEMS: MEAN HEIGHT	AXILLARY TILLER MERISTEMS: NUMBER	AXILLARY TILLER MERISTEMS: MIN. HEIGHT	AXILLARY TILLER MERISTEMS: MAX. HEIGHT	AXILLARY TILLER ORIGINS: MEAN HEIGHT	AXILLARY TILLER ORIGINS: NUMBER	AXILLARY TILLER ORIGINS: MIN. HEIGHT	AXILLARY TILLER ORIGINS: MAX. HEIGHT
			- - - - - - -	- % -	- - - - - -		cm	n/m2	- - - - - cm	- - - - -		n/m2	- - - - - cm	- - - - -		n/m2	- - - cm	- -
MGT 11: 50-CM GROWTH CUT 15-CM STUBBLE ONCE, BOOT CUT TO 8 CM ONCE, THEN 75 CM CUT TO 15 CM																		
11 JUNE	9.78	0.26	6.2	55.8	30.3	7.7	2.5	21.0	0.5	9.0	.	0.0	.	.	.	0.0	.	.
8 JULY	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2 AUG	2.38	0.07	14.4	33.5	48.4	3.7	6.4	32.5	0.2	32.6	7.2	13.0	0.2	21.8	5.0	13.0	0.8	11.0
30 AUG	1.86	0.05	24.4	41.4	32.5	1.7	19.4	19.5	0.2	56.6	20.2	6.5	1.0	38.5	3.0	6.5	0.7	5.1
19 OCT	1.71	0.02	20.2	34.4	44.2	1.2	14.4	34.5	0.1	66.5	7.8	13.5	0.2	33.8	4.5	13.5	0.8	9.8
MGT 12: 50-CM GROWTH CUT TO 15-CM STUBBLE TWICE, BOOT CUT TO 8 CM ONCE, THEN 75 CM CUT TO 15 CM																		
11 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
18 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19 JULY	0.48	0.05	63.1	30.1	6.5	0.3	91.8	13.5	7.0	184.5	.	0.0	.	.	.	0.0	.	.
13 AUG	2.12	0.06	18.9	40.1	38.6	2.3	10.8	24.0	0.2	32.3	5.9	12.5	0.2	16.5	3.5	12.5	1.0	7.3
1 SEPT	3.54	0.05	10.8	36.1	50.3	2.7	5.4	34.0	0.1	26.8	5.0	17.5	0.1	21.5	2.5	17.5	0.4	6.5
12 OCT	0.95	0.01	35.5	33.5	30.5	0.5	27.1	20.0	1.1	90.3	1.4	3.5	0.3	4.3	2.5	3.5	1.1	3.5
MGT 13: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, EARLY BLOOM CUT TO 8 CM ONCE, THEN 75 CM CUT TO 15 CM																		
11 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
14 JULY	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
20 AUG	0.91	0.02	39.0	33.3	27.2	0.6	38.7	18.5	0.8	82.3	34.3	13.5	0.3	78.2	4.5	13.5	0.7	9.2
17 SEPT	2.41	0.02	13.9	32.3	52.7	1.1	9.2	34.5	0.2	32.0	4.6	25.5	0.1	22.3	4.0	25.5	6.6	10.3
19 OCT	20.18	0.04	3.9	24.7	68.2	3.3	4.6	37.0	0.2	13.8	2.2	19.0	0.2	9.8	2.5	19.0	0.4	8.1
MGT 14: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, EARLY BLOOM CUT TO 8 CM ONCE, THEN PRE-BOOT CUT TO 15 CM																		
11 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
14 JULY	0.34	0.20	68.4	23.2	7.0	1.3	104.3	13.0	0.3	233.6	.	0.0	.	.	.	0.0	.	.
20 AUG	0.96	0.03	39.4	36.3	23.5	0.8	27.6	20.0	0.2	82.1	29.8	9.0	0.3	78.2	3.0	9.0	0.4	6.9
12 OCT	0.93	0.03	37.1	33.9	28.1	0.9	31.8	29.5	0.3	111.8	14.8	10.0	0.5	62.5	3.0	10.0	0.6	6.5
MGT 15: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, EARLY BLOOM CUT TO 8 CM ONCE, THEN BOOT CUT TO 8 CM																		
11 JUNE	12.42	0.24	4.6	54.1	33.2	8.0	2.7	25.5	0.5	8.8	.	0.0	.	.	.	0.0	.	.
14 JULY	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30 AUG	0.57	0.03	55.7	31.5	12.3	0.4	59.3	20.5	0.3	180.2	66.7	9.0	0.8	166.8	3.5	9.0	0.9	7.6
19 OCT	4.06	0.05	10.4	34.1	52.8	2.7	4.9	28.0	0.3	15.0	2.8	19.0	0.2	13.5	2.5	19.0	0.4	8.3

TABLE XVI

LEAF/STEM RATIO, CONTRIBUTIONS OF PLANT PARTS TO DRY MATTER PRODUCTION, AND CULM AND TILLER CHARACTERISTICS OF SWEET SIOUX III AT EACH HARVEST OF DIFFERENT MANAGEMENTS, YEAR 1977

	LEAF/STEM RATIO		DRY MATTER CONTRIBUTED BY					PRIMARY CULM AND TILLER MERISTEMS			AXILLARY TILLER MERISTEMS				AXILLARY TILLER ORIGINS			
			ABOVE CUT		BELOW CUT													
DATE	ABOVE CUT	BELOW CUT	STEMS	LEAVES	STEMS	LEAVES	MEAN HEIGHT1/	NUMBER	MIN. HEIGHT	MAX. HEIGHT	MEAN HEIGHT	NUMBER	MIN. HEIGHT	MAX. HEIGHT	MEAN HEIGHT	NUMBER	MIN. HEIGHT	MAX. HEIGHT
			- - - - - - - %	- - - - - -			cm	n/m²	- - - - -	cm - - - - -		n/m²	- - - - -	cm - - - - -		n/m²	- - -	cm - -
MGT 2: 90-CM GROWTH CUT TO 15-CM STUBBLE																		
16 JUNE	2.45	0.10	21.3	51.5	24.6	2.6	20.0	9.0	7.6	30.3	.	0.0	.	.	.	0.0	.	.
5 JULY	1.21	0.10	35.2	42.8	19.9	2.1	20.0	15.5	0.3	84.0	14.3	1.0	11.0	17.5	5.0	1.0	5.0	5.0
29 JULY	1.23	0.11	31.8	38.2	26.9	3.1	31.9	12.5	0.8	62.3	20.9	2.5	4.5	31.0	6.5	2.5	5.3	10.0
25 AUG	1.33	0.01	25.1	32.9	41.6	0.4	22.0	14.5	0.3	59.3	.	0.0	.	.	.	0.0	.	.
22 SEPT	1.07	0.15	32.8	35.8	29.9	1.4	30.1	15.0	2.0	87.1	27.0	8.0	5.8	46.3	6.5	8.0	2.0	11.0
MGT 4: BOOT CUT TO 8-CM STUBBLE																		
29 JUNE	0.64	0.15	56.4	36.3	6.3	1.0	128.3	8.0	68.8	163.5	.	0.0	.	.	.	0.0	.	.
4 AUG	0.53	0.00	59.1	31.4	9.4	0.0	72.3	13.5	5.5	160.0	76.2	4.5	24.5	142.0	4.5	4.5	3.5	5.6
20 SEPT	0.78	0.02	38.8	29.8	30.6	0.7	47.7	12.5	0.8	122.3	5.3	1.0	2.0	8.5	9.0	1.0	8.7	9.2
MGT 5: EARLY BLOOM CUT TO 8-CM STUBBLE																		
5 JULY	0.68	0.00	57.8	36.3	5.8	0.0	130.7	14.0	27.1	201.5	.	0.0	.	.	.	0.0	.	.
22 AUG	0.36	0.00	63.4	22.9	13.7	0.0	111.7	9.0	20.0	222.0	7.3	1.0	3.5	13.0	7.0	1.0	4.0	10.0
6 OCT	1.02	0.01	29.6	28.2	41.7	0.5	34.3	13.0	8.2	74.3	14.0	0.7	9.0	19.0	5.0	0.7	4.0	5.0
MGT 8: 90-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN PRE-BOOT CUT TO 15 CM																		
16 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
8 JULY	0.88	0.05	41.7	36.3	20.7	1.3	36.9	15.0	0.5	93.8	16.6	2.0	1.5	30.0	6.0	2.0	4.5	8.0
16 AUG	0.57	0.05	48.9	27.8	21.9	1.3	60.1	9.5	6.3	153.0	11.8	3.5	0.8	35.5	7.0	3.5	3.5	9.5
22 SEPT	0.92	0.03	27.8	25.3	45.5	1.4	33.2	13.0	0.5	85.0	13.3	1.5	13.3	13.3	8.0	1.5	6.3	9.3
MGT 16: 90-CM GROWTH CUT TO 8-CM STUBBLE																		
16 JUNE	1.70	0.08	31.1	52.6	15.1	1.3	21.4	11.5	8.8	33.3	.	0.0	.	.	.	0.0	.	.
5 JULY	1.21	0.03	37.9	45.9	15.6	0.6	14.2	31.0	0.2	48.8	4.3	3.5	0.8	10.3	2.5	3.5	1.3	4.0
1 AUG	0.93	0.00	43.0	39.8	17.2	0.0	36.7	17.5	0.5	81.3	1.3	1.0	1.3	1.3	3.5	1.0	3.3	3.3
30 AUG	1.72	0.01	25.7	40.9	33.0	0.4	12.8	13.0	1.5	30.8	7.8	3.7	3.8	18.4	3.7	3.7	2.8	4.5
7 OCT	1.47	0.04	23.0	33.8	41.5	1.7	15.7	15.5	5.5	37.5	11.7	1.5	4.0	18.0	4.0	1.5	2.5	5.0

TABLE XVI (Continued)

DATE	LEAF/STEM RATIO ABOVE CUT	LEAF/STEM RATIO BELOW CUT	DRY MATTER CONTRIBUTED BY ABOVE CUT STEMS	ABOVE CUT LEAVES	BELOW CUT STEMS	BELOW CUT LEAVES	PRIMARY CULM AND TILLER MERISTEMS MEAN HEIGHT1/	NUMBER	MIN. HEIGHT	MAX. HEIGHT	AXILLARY TILLER MERISTEMS MEAN HEIGHT	NUMBER	MIN. HEIGHT	MAX. HEIGHT	AXILLARY TILLER ORIGINS MEAN HEIGHT	NUMBER	MIN. HEIGHT	MAX. HEIGHT
			- - - - - - - %	- - - - - -			cm	n/m2	- - - - - cm	- - - - -		n/m2	- - - - - cm	- - - - -		n/m2	- - - cm	- -
MGT 17: 90-CM GROWTH CUT TO 8-CM STUBBLE ONCE, THEN PRE-BOOT CUT TO 8 CM																		
16 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
18 JULY	0.52	0.01	58.4	29.5	11.9	0.2	75.9	13.0	0.3	173.8	10.8	1.0	0.5	21.0	13.0	1.0	9.6	17.0
30 AUG	0.54	0.03	54.0	29.5	15.9	0.6	91.4	9.5	1.8	198.0	39.1	3.5	5.3	69.8	7.0	3.5	2.9	10.8
7 OCT	1.88	0.01	13.4	25.3	60.6	0.7	13.7	9.5	1.0	40.0	10.4	5.0	1.5	31.5	4.5	5.0	1.0	8.5
MGT 18: 90-CM GROWTH CUT TO 8-CM STUBBLE ONCE, THEN BOOT CUT TO 8 CM																		
16 JUNE	1.54	0.09	32.6	49.8	16.1	1.5	25.2	9.5	5.0	37.0	.	0.0	.	.	.	0.0	.	.
18 JULY	0.55	0.00	58.8	32.5	8.6	0.0	66.8	11.0	0.5	155.5	.	0.0	.	.	.	0.0	.	.
30 AUG	0.58	0.00	50.0	29.3	20.6	0.1	72.1	13.0	1.3	164.8	0.8	1.0	0.8	0.8	9.5	1.0	9.3	9.3
7 OCT	1.61	0.01	17.5	28.3	53.7	0.5	14.1	10.5	3.0	32.3	7.3	1.5	7.0	8.0	6.0	1.5	4.0	11.0
MGT 19: 90-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN BOOT CUT TO 8 CM																		
16 JUNE	1.82	0.13	27.8	48.2	21.3	2.7	22.0	11.3	3.5	45.3	.	0.0	.	.	.	0.0	.	.
18 JULY	0.62	0.00	57.1	35.0	8.0	0.0	70.3	10.5	9.8	153.0	.	0.0	.	.	.	0.0	.	.
30 AUG	0.50	0.00	59.5	29.3	11.1	0.1	81.8	12.0	2.8	188.0	2.0	2.0	1.5	2.5	7.5	2.0	7.3	8.0
7 OCT	1.09	0.00	27.6	29.6	42.6	0.2	20.1	13.0	4.8	50.8	18.2	3.0	3.5	34.5	5.5	3.0	2.3	7.5

TABLE XVII

HARVESTED YIELDS, ABOVE AND BELOW CUT YIELDS OF STEMS AND LEAVES, PERCENT IVDMD AND TOTAL N, AND SOME MORPHOLOGICAL CHARACTERISTICS OF FS-531 AT EACH HARVEST OF DIFFERENT MANAGEMENTS, YEAR 1976

DATE	ABOVE CUT YIELD, M² SAMPLE	0.14 M² SAMPLE: STEMS ABOVE CUT	STEMS BELOW CUT	LEAVES ABOVE CUT	LEAVES BELOW CUT	STEMS + LEAVES ABOVE CUT	STEMS + LEAVES BELOW CUT	YIELD ABOVE GROUND	PLANT HEIGHT	STEMS LIVE	STEMS DEAD	LIVE	IN-VITRO DRY MATTER DIGEST.	TOTAL NITROGEN ABOVE CUT	TOTAL NITROGEN BELOW CUT	LEAF AREA INDEX ABOVE CUT	LEAF AREA INDEX ABOVE GROUND	LEAF AREA INDEX BELOW CUT
	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	cm	n/m²	n/m²	%	%	%	%			
MGT 1: 50-CM GROWTH CUT TO 15-CM STUBBLE																		
11 JUNE	907	63	623	1198	88	1261	710	1972	.	116	0	100	82.9	2.43	2.17	2.70	2.91	0.21
18 JUNE	687	212	673	847	104	1058	777	1835	59	118	0	100	80.6	2.26	1.47	2.06	2.27	0.21
28 JUNE	851	201	775	962	172	1163	947	2110	.	135	0	100	80.9	2.55	1.75	2.35	2.44	0.09
13 JULY	697	158	624	725	309	883	933	1816	52	97	0	100	79.8	2.08	0.93	1.51	1.54	0.03
28 JULY	279	86	768	348	36	434	804	1238	46	97	5	95	79.9	2.16	0.81	0.84	0.84	0.00
13 AUG	400	32	818	398	22	431	840	1270	44	108	38	74	79.5	3.58	1.68	0.81	0.84	0.03
30 AUG	613	237	1094	969	14	1206	1109	2314	52	81	27	73	78.9	3.81	1.95	1.95	1.97	0.02
5 OCT	707	591	804	605	7	1196	811	2007	52	14	14	79	79.1	2.30	1.18	1.09	1.10	0.01
MGT 2: 90-CM GROWTH CUT TO 15-CM STUBBLE																		
21 JUNE	3990	1383	1306	2545	103	3928	1409	5337	95	108	0	100	74.7	1.94	1.06	6.22	6.27	0.05
16 JULY	1473	653	1206	1636	226	2289	1432	3721	77	151	59	73	75.2	2.22	1.44	4.10	4.19	0.08
12 AUG	1945	965	1284	1650	22	2616	1306	3922	85	81	75	52	75.6	2.74	1.58	3.30	3.31	0.01
9 SEPT	1558	1256	1483	2057	29	3313	1512	4825	91	115	43	74	76.1	2.32	1.39	2.36	2.39	0.03
19 OCT	721	542	1945	1170	39	1711	1984	3696	52	113	151	43	76.1	2.39	1.75	1.53	1.59	0.06
MGT 3: PRE-BOOT CUT TO 15-CM STUBBLE																		
30 JUNE	6802	3642	1238	3681	86	7323	1324	8647	162	102	0	100	.	1.05	0.40	7.46	7.48	0.02
26 AUG	7571	3892	1969	2990	29	6882	1997	8879	184	100	104	51	.	1.84	1.01	5.88	5.88	0.01
14 OCT	1343	133	1636	675	61	807	1697	2504	56	108	81	57	.	2.94	2.09	1.47	1.57	0.10
MGT 4: BOOT CUT TO 8-CM STUBBLE																		
26 JULY	21325	19867	1227	8015	0	27882	1227	29109	269	86	0	100	64.8	1.08	0.26	24.56	24.56	0.00
22 SEPT	8502	4715	1546	2673	0	7388	1546	8934	191	97	86	52	67.6	1.45	1.12	4.96	4.96	0.00
MGT 5: EARLY BLOOM CUT TO 8-CM STUBBLE																		
2 AUG	20275	17215	1511	6419	0	23634	1511	25144	279	124	0	100	60.2	0.74	0.32	11.27	11.27	0.00
28 SEPT	6478	4141	1768	3069	0	7209	1768	8977	169	115	82	58	.	2.09	1.37	5.57	5.57	0.00

TABLE XVII (Continued)

DATE	ABOVE CUT YIELD, M2 SAMPLE	0.14 M2 SAMPLE STEMS ABOVE CUT	STEMS BELOW CUT	LEAVES ABOVE CUT	LEAVES BELOW CUT	STEMS + LEAVES ABOVE CUT	STEMS + LEAVES BELOW CUT	YIELD ABOVE GROUND	PLANT HEIGHT	STEMS LIVE	STEMS DEAD	LIVE	IN-VITRO DRY MATTER DIGEST.	TOTAL NITROGEN ABOVE CUT	TOTAL NITROGEN BELOW CUT	LEAF AREA INDEX ABOVE CUT	LEAF AREA INDEX ABOVE GROUND	LEAF AREA INDEX BELOW CUT
	kg/ha								cm	n/m2		%						
MGT 6: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN 90-CM CUT TO 15 CM																		
11 JUNE	893	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28 JUNE	2455	1058	987	2336	61	3394	1048	4442	.	167	5	96	77.6	2.08	1.18	5.45	5.55	0.09
26 JULY	1655	1048	1259	1604	68	2652	1328	3979	78	91	11	91	76.3	1.40	0.78	3.07	3.10	0.03
23 AUG	3196	1066	1697	1934	65	3000	1762	4761	97	172	81	70	77.3	2.85	1.73	3.87	3.91	0.04
12 OCT	2317	622	1531	1174	7	1796	1538	3334	88	147	75	66	78.1	1.71	1.30	2.03	2.04	0.01
MGT 7: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN 90 CM TO 15 CM ONCE, THEN 50 CM TO 15 CM, TWICE, THEN 75 CM TO 15 CM																		
11 JUNE	893	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28 JUNE	2455	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19 JULY	621	258	1112	1048	118	1306	1231	2537	54	178	70	72	.	1.94	0.96	2.39	2.45	0.05
2 AUG	682	183	1245	771	57	954	1302	2257	50	156	75	68	.	2.49	0.87	1.59	1.61	0.02
26 AUG	2424	736	1435	2067	36	2802	1471	4273	87	108	102	51	.	2.98	1.95	4.72	4.73	0.01
5 OCT	1128	570	1069	919	36	1489	1105	2594	60	70	48	57	.	2.49	1.55	1.68	1.72	0.03
MGT 8: 90-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN PRE-BOOT CUT TO 15 CM																		
21 JUNE	3990	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17 AUG	8350	5502	1799	3452	5	8953	1804	10757	187	93	79	54	64.3	1.40	1.08	6.14	6.14	0.00
12 OCT	2637	2171	1934	2397	25	4567	1959	6527	93	199	108	65	74.1	1.94	0.91	4.32	4.32	0.00
MGT 9: 50-CM GROWTH CUT TO 15-CM STUBBLE, PRE-BOOT CUT TO 15 CM, 50 CM CUT TO 15 CM, EACH ONCE, THEN 75 CM CUT TO 15 CM																		
11 JUNE	893	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19 JULY	11304	6889	1342	4105	29	10994	1371	12364	206	59	0	100	.	0.85	0.35	7.85	7.88	0.03
17 AUG	1620	1216	2784	2483	68	3699	2852	6552	83	183	86	68	.	3.16	1.64	5.48	5.56	0.08
3 SEPT	1199	466	1855	940	22	1406	1877	3283	69	102	86	54	.	3.10	1.72	2.05	2.07	0.02
19 OCT	1425	420	1873	1195	18	1615	1891	3505	70	129	118	52	.	2.85	1.74	1.79	1.82	0.03

TABLE XVII (Continued)

DATE	ABOVE CUT YIELD, M2 SAMPLE	0.14 M2 SAMPLE: STEMS ABOVE CUT	STEMS BELOW CUT	LEAVES ABOVE CUT	LEAVES BELOW CUT	STEMS + LEAVES ABOVE CUT	STEMS + LEAVES BELOW CUT	YIELD ABOVE GROUND	PLANT HEIGHT	STEMS LIVE	STEMS DEAD	LIVE	IN-VITRO DRY MATTER DIGEST.	TOTAL NITROGEN ABOVE CUT	TOTAL NITROGEN BELOW CUT	LEAF AREA INDEX ABOVE CUT	LEAF AREA INDEX ABOVE GROUND	LEAF AREA INDEX BELOW CUT
	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	cm	n/m^2	n/m^2		%	%	%			
MGT 10: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN BOOT CUT TO 8 CM																		
11 JUNE	893	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12 AUG	21299	16544	1048	5177	0	21722	1048	22769	262	65	0	100	.	1.25	0.29	7.45	7.45	0.00
12 OCT	8249	7639	1572	5070	14	12709	1586	14294	156	145	54	79	.	1.86	1.19	8.80	8.80	0.00
MGT 11: 50-CM GROWTH CUT 15-CM STUBBLE ONCE, BOOT CUT TO 8 CM ONCE, THEN 75 CM CUT TO 15 CM																		
11 JUNE	884	63	671	1272	111	1335	782	2117	.	121	0	100	.	2.58	2.08	2.81	3.07	0.26
12 AUG	21299	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9 SEPT	2976	1119	2508	2608	61	3728	2569	6297	95	307	108	74	.	2.68	1.59	5.65	5.74	0.09
19 OCT	1117	499	2325	1166	36	1665	2361	4026	51	178	140	56	.	2.55	0.50	1.95	1.99	0.03
MGT 12: 50-CM GROWTH CUT TO 15-CM STUBBLE TWICE, BOOT CUT TO 8 CM ONCE, THEN 75 CM CUT TO 15 CM																		
11 JUNE	893	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
18 JUNE	687	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17 AUG	14362	10312	1206	5084	14	15396	1220	16616	255	108	16	90	63.6	1.46	0.64	8.37	8.37	0.00
28 SEPT	1947	1055	1783	2178	47	3233	1830	5063	83	194	75	72	77.1	2.43	1.46	4.46	4.51	0.05
MGT 13: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, EARLY BLOOM CUT TO 8 CM ONCE, THEN 75 CM CUT TO 15 CM																		
11 JUNE	893	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
13 AUG	16061	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
14 SEPT	2532	1116	2085	2221	86	3337	2171	5508	91	205	86	70	.	2.58	1.62	5.04	5.18	0.13
19 OCT	840	165	1991	624	29	789	2020	2809	44	210	102	67	.	3.15	1.50	0.81	0.86	0.04

TABLE XVII (Continued)

DATE	ABOVE CUT YIELD, M^2 SAMPLE	0.14 M^2 SAMPLE: STEMS ABOVE CUT	STEMS BELOW CUT	LEAVES ABOVE CUT	LEAVES BELOW CUT	STEMS + LEAVES ABOVE CUT	STEMS + LEAVES BELOW CUT	YIELD ABOVE GROUND	PLANT HEIGHT	STEMS LIVE	STEMS DEAD	LIVE	IN-VITRO DRY MATTER DIGEST.	TOTAL NITROGEN ABOVE CUT	TOTAL NITROGEN BELOW CUT	LEAF AREA INDEX ABOVE CUT	LEAF AREA INDEX ABOVE GROUND	LEAF AREA INDEX BELOW CUT
	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	cm	n/m^2	n/m^2	%	%	%	%			
MGT 14: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, EARLY BLOOM CUT TO 8 CM ONCE, THEN PRE-BOOT CUT TO 15 CM																		
11 JUNE	893	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
13 AUG	16061	14338	1396	5590	0	19928	1396	21323	253	151	0	100	63.6	1.16	0.23	10.63	10.63	0.00
5 OCT	5063	4585	2063	4008	32	8593	2095	10689	127	221	38	88	74.4	2.06	1.30	6.51	6.53	0.01
MGT 15: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, EARLY BLOOM CUT TO 8 CM ONCE, THEN BOOT CUT TO 8 CM																		
11 JUNE	887	133	710	1324	104	1457	814	2271	.	137	0	100	.	2.17	2.08	3.19	3.45	0.26
13 AUG	16061	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5 OCT	5477	3712	2016	3112	0	6824	2016	8841	137	136	79	63	74.7	1.63	1.12	5.78	5.78	0.00

TABLE XVIII

HARVESTED YIELDS, ABOVE AND BELOW CUT YIELDS OF STEMS AND LEAVES, PERCENT IVDMD AND TOTAL N, AND SOME MORPHOLOGICAL CHARACTERISTICS OF FS-531 AT EACH HARVEST OF DIFFERENT MANAGEMENTS, YEAR 1977

DATE	ABOVE CUT YIELD, M^2 SAMPLE	0.14 M^2 SAMPLE: STEMS ABOVE CUT	STEMS BELOW CUT	LEAVES ABOVE CUT	LEAVES BELOW CUT	STEMS + LEAVES ABOVE CUT	STEMS + LEAVES BELOW CUT	YIELD ABOVE GROUND	PLANT HEIGHT	STEMS LIVE	STEMS DEAD	LIVE	IN-VITRO DRY MATTER DIGEST.	TOTAL NITROGEN ABOVE CUT	TOTAL NITROGEN BELOW CUT	LEAF AREA INDEX ABOVE CUT	LEAF AREA INDEX ABOVE GROUND	LEAF AREA INDEX BELOW CUT
	kg/ha								cm	n/m^2			%					
MGT 5: EARLY BLOOM CUT TO 8-CM STUBBLE																		
26 JULY	23660	22773	1525	9200	0	31972	1525	33497	263	108	0	100	52.4	0.83	0.82	14.87	14.87	0.00
6 OCT	8364	7159	1698	4160	7	11319	1705	13024	220	61	54	53	60.9	0.99	0.62	7.34	7.34	0.00
MGT 19: 90-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN BOOT CUT TO 8 CM																		
21 JUNE	3832	1891	893	2867	126	4758	1019	5777	116	86	0	100	75.7	2.82	2.25	6.81	6.96	0.14
6 SEPT	11871	7316	922	3574	0	10889	922	11812	255	59	11	88	56.7	1.26	1.07	4.76	4.76	0.00
7 OCT	587	319	972	718	0	1037	972	2009	48	81	32	71	85.5	2.87	1.19	1.65	1.65	0.00

TABLE XIX

LEAF/STEM RATIO, CONTRIBUTIONS OF PLANT PARTS TO DRY MATTER PRODUCTION, AND CULM AND TILLER CHARACTERISTICS OF FS-531 AT EACH HARVEST OF DIFFERENT MANAGEMENTS, YEAR 1976

	LEAF/STEM RATIO		DRY MATTER CONTRIBUTED BY				PRIMARY CULM AND TILLER MERISTEMS				AXILLARY TILLER MERISTEMS				AXILLARY TILLER ORIGINS			
			ABOVE CUT		BELOW CUT													
DATE	ABOVE CUT	BELOW CUT	STEMS	LEAVES	STEMS	LEAVES	MEAN HEIGHT1/	NUMBER	MIN. HEIGHT	MAX. HEIGHT	MEAN HEIGHT	NUMBER	MIN. HEIGHT	MAX. HEIGHT	MEAN HEIGHT	NUMBER	MIN. HEIGHT	MAX. HEIGHT
			%				cm	n/m2	cm			n/m2	cm			n/m2	cm	
MGT 1: 50-CM GROWTH CUT TO 15-CM STUBBLE																		
11 JUNE	19.24	0.14	3.2	60.5	31.7	4.5	1.8	10.8	0.8	3.3	.	0.0	.	.	.	0.0	.	.
18 JUNE	4.31	0.15	11.4	46.0	36.8	5.8	3.5	11.0	1.1	5.7	.	0.0	.	.	.	0.0	.	.
28 JUNE	4.79	0.21	9.6	45.8	36.7	7.9	3.9	12.5	0.5	8.6	.	0.0	.	.	.	0.0	.	.
13 JULY	4.63	0.49	8.7	39.9	34.4	17.0	6.1	13.5	2.0	10.6	.	0.0	.	.	.	0.0	.	.
28 JULY	4.01	0.04	7.0	27.9	62.1	3.0	6.7	9.0	3.3	9.8	.	0.0	.	.	.	0.0	.	.
13 AUG	13.08	0.03	2.5	31.1	64.6	1.8	5.8	10.0	1.0	9.6	0.7	2.0	0.2	2.0	2.0	2.0	1.0	5.8
30 AUG	4.08	0.01	10.2	41.9	47.3	0.6	8.5	7.5	4.5	14.8	.	0.0	.	.	.	0.0	.	.
5 OCT	1.64	0.01	24.2	29.0	46.5	0.3	22.2	5.0	6.0	50.8	12.8	0.7	5.5	20.0	4.0	0.7	3.0	5.0
MGT 2: 90-CM GROWTH CUT TO 15-CM STUBBLE																		
21 JUNE	1.85	0.08	26.1	48.3	23.8	1.9	21.0	10.0	13.0	27.3	.	0.0	.	.	.	0.0	.	.
16 JULY	2.83	0.19	17.2	44.0	32.7	6.1	5.4	14.0	0.3	17.0	.	0.0	.	.	.	0.0	.	.
12 AUG	1.93	0.02	23.0	42.1	34.1	0.8	14.8	7.5	2.8	26.6	4.0	0.5	4.0	4.0	1.0	0.5	1.0	1.0
9 SEPT	1.79	0.02	25.0	42.4	31.9	0.7	14.2	10.7	0.7	35.2	5.6	2.0	2.3	11.3	4.5	2.0	2.3	7.0
19 OCT	2.72	0.01	14.3	32.7	52.0	1.0	10.7	10.5	1.1	26.1	5.2	4.5	0.8	14.8	4.0	4.5	2.0	5.6
MGT 3: PRE-BOOT CUT TO 15-CM STUBBLE																		
30 JUNE	1.00	0.07	42.2	42.4	14.4	1.0	54.5	9.5	6.6	72.0	.	0.0	.	.	.	0.0	.	.
26 AUG	0.87	0.01	41.5	34.4	23.7	0.3	64.5	9.3	1.4	117.8	.	0.0	.	.	.	0.0	.	.
14 OCT	6.53	0.04	4.9	26.1	66.4	2.6	4.8	10.0	1.5	10.8	2.7	6.0	0.6	7.3	2.0	6.0	0.8	3.0
MGT 4: BOOT CUT TO 8-CM STUBBLE																		
26 JULY	0.40	0.00	68.2	27.6	4.2	0.0	211.0	8.0	155.0	269.0	.	0.0	.	.	.	0.0	.	.
22 SEPT	0.57	0.00	52.4	30.1	17.6	0.0	70.4	9.0	13.2	163.2	36.7	1.5	16.2	57.3	2.0	1.5	1.5	2.5
MGT 5: EARLY BLOOM CUT TO 8-CM STUBBLE																		
2 AUG	0.37	0.00	68.6	25.6	5.8	0.0	184.9	11.5	81.5	268.5	.	0.0	.	.	.	0.0	.	.
28 SEPT	0.80	0.00	44.9	34.3	20.8	0.0	46.1	10.7	3.0	109.3	12.8	2.3	2.3	30.0	2.5	2.3	1.3	3.8
MGT 6: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN 90-CM CUT TO 15 CM																		
11 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28 JUNE	2.18	0.06	23.7	51.9	22.8	1.5	8.4	15.5	0.2	23.9	.	0.0	0.0	.	.	0.0	.	.
26 JULY	1.53	0.05	26.3	40.3	31.6	1.7	14.6	8.5	0.3	35.5	.	0.0	.	.	.	0.0	.	.
23 AUG	2.20	0.04	20.9	40.9	36.7	1.5	10.0	16.0	0.2	31.0	2.9	4.5	0.1	8.3	6.5	4.5	2.8	8.7
12 OCT	2.36	0.00	17.2	35.4	47.2	0.2	13.1	13.7	0.9	38.5	7.3	5.7	0.4	20.0	4.0	5.7	1.7	7.7

TABLE XIX (Continued)

DATE	LEAF/STEM RATIO ABOVE CUT	LEAF/STEM RATIO BELOW CUT	DRY MATTER CONTRIBUTED BY: ABOVE CUT STEMS	ABOVE CUT LEAVES	BELOW CUT STEMS	BELOW CUT LEAVES	PRIMARY CULM AND TILLER MERISTEMS: MEAN HEIGHT1/	NUMBER	MIN. HEIGHT	MAX. HEIGHT	AXILLARY TILLER MERISTEMS: MEAN HEIGHT	NUMBER	MIN. HEIGHT	MAX. HEIGHT	AXILLARY TILLER ORIGINS: MEAN HEIGHT	NUMBER	MIN. HEIGHT	MAX. HEIGHT
			- - - - - - - %	- - - - - -			cm	n/m^2	- - - - - cm	- - - - -		n/m^2	- - - - - cm	- - - - -		n/m^2	- - - cm	- -
MGT 7: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN 90 CM TO 15 CM ONCE, THEN 50 CM TO 15 CM, TWICE, THEN 75 CM TO 15 CM																		
11 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19 JULY	4.15	0.10	10.0	41.2	44.4	4.4	3.4	16.5	0.3	16.1	1.0	0.5	1.0	1.0	1.0	0.5	1.0	1.0
2 AUG	4.44	0.04	8.0	34.4	55.1	2.5	3.0	14.5	0.3	15.1	.	0.0	.	.	.	0.0	.	.
26 AUG	2.83	0.02	17.1	48.2	33.9	0.8	7.4	10.0	1.1	15.5	7.3	0.5	7.3	7.3	1.0	0.5	1.3	1.3
5 OCT	2.06	0.03	19.6	33.8	45.1	1.5	13.7	6.5	1.5	37.3	.	0.0	.	.	.	0.0	.	.
MGT 8: 90-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN PRE-BOOT CUT TO 15 CM																		
21 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17 AUG	0.83	0.00	46.4	33.8	19.8	0.0	70.9	8.7	8.1	126.8	.	0.0	.	.	.	0.0	.	.
12 OCT	1.14	0.01	32.8	37.1	29.7	0.5	21.3	18.5	0.5	69.5	9.1	6.5	0.3	43.8	6.5	6.5	2.5	10.6
MGT 9: 50-CM GROWTH CUT TO 15-CM STUBBLE, PRE-BOOT CUT TO 15 CM, 50 CM CUT TO 15 CM, EACH ONCE, THEN 75 CM CUT TO 15 CM																		
11 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
19 JULY	0.59	0.02	55.7	33.2	10.8	0.3	114.1	5.5	61.0	143.8	.	0.0	.	.	.	0.0	.	.
17 AUG	2.04	0.02	18.6	37.9	42.5	1.0	9.9	17.0	1.0	22.5	4.5	8.5	0.3	17.5	6.5	8.5	1.1	13.8
3 SEPT	2.38	0.01	13.8	29.2	56.3	0.7	9.9	9.5	2.0	19.0	4.9	4.5	1.5	9.0	2.0	4.5	0.8	3.5
19 OCT	2.92	0.01	11.7	33.9	53.9	0.4	8.5	12.0	1.1	19.8	11.9	2.5	8.0	16.0	1.0	2.5	0.5	1.5
MGT 10: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN BOOT CUT TO 8 CM																		
11 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
12 AUG	0.31	0.00	72.6	22.7	4.7	0.0	197.6	6.0	74.3	290.5	.	0.0	.	.	.	0.0	.	.
12 OCT	0.66	0.01	53.1	35.4	11.4	0.1	53.9	13.5	0.5	123.8	.	0.0	.	.	.	0.0	.	.
MGT 11: 50-CM GROWTH CUT 15-CM STUBBLE ONCE, BOOT CUT TO 8 CM ONCE, THEN 75 CM CUT TO 15 CM																		
11 JUNE	22.28	0.16	3.1	59.5	32.1	5.3	1.9	11.3	0.9	3.4	.	0.0	.	.	.	0.0	.	.
12 AUG	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
9 SEPT	2.40	0.02	17.3	40.9	40.8	1.0	6.4	28.5	0.2	20.0	6.1	10.5	0.8	16.0	2.5	10.5	1.0	10.0
19 OCT	2.70	0.02	11.5	28.8	58.7	0.9	8.6	16.5	0.8	28.8	6.3	5.5	0.8	18.0	2.0	5.5	0.5	4.3

TABLE XIX (Continued)

DATE	LEAF/STEM RATIO		DRY MATTER CONTRIBUTED BY				PRIMARY CULM AND TILLER MERISTEMS				AXILLARY TILLER MERISTEMS				AXILLARY TILLER ORIGINS			
	ABOVE CUT	BELOW CUT	ABOVE CUT STEMS	ABOVE CUT LEAVES	BELOW CUT STEMS	BELOW CUT LEAVES	MEAN HEIGHT1/	NUMBER	MIN. HEIGHT	MAX. HEIGHT	MEAN HEIGHT	NUMBER	MIN. HEIGHT	MAX. HEIGHT	MEAN HEIGHT	NUMBER	MIN. HEIGHT	MAX. HEIGHT
			- - - - - - - %	- - - - - -			cm	n/m²	- - - - - cm	- - - - - -		n/m²	- - - - - cm	- - - - -		n/m²	- - - cm	- -
MGT 12: 50-CM GROWTH CUT TO 15-CM STUBBLE TWICE, BOOT CUT TO 8 CM ONCE, THEN 75 CM CUT TO 15 CM																		
11 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
13 AUG									.	.	.	.	.	.	.	.	.	
14 SEPT	1.98	0.04	20.3	40.3	37.8	1.5	8.2	19.0	0.3	23.4	2.7	7.5	0.3	11.5	3.0	7.5	0.6	7.8
19 OCT	3.66	0.01	5.9	21.6	71.7	0.8	5.0	19.5	0.5	17.8	1.1	12.0	0.5	5.0	3.5	12.0	0.5	7.0
MGT 13: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, EARLY BLOOM CUT TO 8 CM ONCE, THEN 75 CM CUT TO 15 CM																		
11 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
18 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
17 AUG	0.49	0.01	62.0	30.6	7.3	0.1	125.0	10.0	38.2	238.2	.	0.0	.	.	.	0.0	.	.
28 SEPT	2.12	0.02	20.7	43.1	35.3	0.9	10.3	18.0	1.0	35.3	7.1	13.5	0.8	33.8	3.0	13.5	0.8	6.5
MGT 14: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, EARLY BLOOM CUT TO 8 CM ONCE, THEN PRE-BOOT CUT TO 15 CM																		
11 JUNE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
13 AUG	0.39	0.00	67.1	26.2	6.6	0.0	135.6	14.0	48.3	231.9	.	0.0	.	.	.	0.0	.	.
5 OCT	0.87	0.01	42.8	37.4	19.4	0.3	35.0	20.5	0.5	91.3	1.0	2.0	0.5	1.5	4.0	2.0	1.5	8.0
MGT 15: 50-CM GROWTH CUT TO 15-CM STUBBLE ONCE, EARLY BLOOM CUT TO 8 CM ONCE, THEN BOOT CUT TO 8 CM																		
11 JUNE	10.61	0.15	5.8	58.3	31.4	4.6	1.8	12.8	0.5	3.1	.	0.0	.	.	.	0.0	.	.
13 AUG	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5 OCT	0.87	0.00	42.0	35.5	22.5	0.0	41.7	12.7	1.9	91.7	2.0	0.7	2.0	2.0	3.0	0.7	2.8	2.8

TABLE XX

LEAF/STEM RATIO, CONTRIBUTIONS OF PLANT PARTS TO DRY MATTER PRODUCTION, AND CULM AND TILLER CHARACTERISTICS OF FS-531 AT EACH HARVEST OF DIFFERENT MANAGEMENTS, YEAR 1977

DATE	LEAF/STEM RATIO ABOVE CUT	LEAF/STEM RATIO BELOW CUT	DRY MATTER CONTRIBUTED BY ABOVE CUT STEMS	DRY MATTER CONTRIBUTED BY ABOVE CUT LEAVES	DRY MATTER CONTRIBUTED BY BELOW CUT STEMS	DRY MATTER CONTRIBUTED BY BELOW CUT LEAVES	PRIMARY CULM AND TILLER MERISTEMS MEAN HEIGHT[1/]	PRIMARY CULM AND TILLER MERISTEMS NUMBER	PRIMARY CULM AND TILLER MERISTEMS MIN. HEIGHT	PRIMARY CULM AND TILLER MERISTEMS MAX. HEIGHT	AXILLARY TILLER MERISTEMS MEAN HEIGHT	AXILLARY TILLER MERISTEMS NUMBER	AXILLARY TILLER MERISTEMS MIN. HEIGHT	AXILLARY TILLER MERISTEMS MAX. HEIGHT	AXILLARY TILLER ORIGINS MEAN HEIGHT	AXILLARY TILLER ORIGINS NUMBER	AXILLARY TILLER ORIGINS MIN. HEIGHT	AXILLARY TILLER ORIGINS MAX. HEIGHT
			- - - - - - -	%	- - - - - -		cm	n/m2	- - - - -	cm - - - - -		n/m2	- - - - -	cm - - - - -		n/m2	- - - cm	- -
MGT 5: EARLY BLOOM CUT TO 8-CM STUBBLE																		
26 JULY	0.40	0.00	68.0	27.4	4.6	0.0	181.3	10.0	110.8	242.0	.	0.0	.	.	.	0.0	.	.
6 OCT	0.60	0.00	54.6	32.1	13.2	0.1	111.7	5.7	28.3	187.2	.	0.0	.	.	.	0.0	.	.
MGT 19: 90-CM GROWTH CUT TO 15-CM STUBBLE ONCE, THEN BOOT CUT TO 8 CM																		
21 JUNE	1.52	0.14	32.6	49.6	15.6	2.2	36.0	8.0	20.0	47.8	.	0.0	.	.	.	0.0	.	.
6 SEPT	0.54	0.00	59.4	31.9	8.6	0.0	103.6	5.5	31.0	183.8	4.0	0.5	4.0	4.0	11.0	0.5	11.0	11.0
7 OCT	2.33	0.00	15.6	35.2	49.2	0.0	9.0	7.5	4.5	18.5	6.3	2.0	5.5	7.5	5.5	2.0	4.8	5.8

VITA

Rodney Joseph Creel was born in La Rochelle, France on January 15, 1952. He is the son of Major and Mrs. Adonis Creel and traveled with them on tours in the Army. He graduated from Lewis County High School in Hohenwald, Tennessee.

In March of 1976 he received the Bachelor of Science in Plant and Soil Science from the University of Tennessee. A graduate research assistantship was accepted from the Department of Plant and Soil Science at the University of Tennessee, and he received the Master of Science degree in December 1978.

He was married to Vicky Wolfe in June 1978 and is currently working with the Extension Service as an Assistant Extension Agent in Loudon County. He is a member of the American Society of Agronomy and Gamma Sigma Delta.