

## Grass Growth in Height

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The mixed grass prairie consists of an assemblage of mid grasses, short grasses, and sedges. Each species exhibits a characteristic growth pattern during its seasonal development from active vegetative growth in spring through the stages of flower stalk growth.

An understanding of the growth patterns of grassland plants is essential for development of proper management practices for grassland ecosystems. At the Dickinson Experiment Station, Dr. Warren C. Whitman and Dr. Harold Goetz conducted an 8-year study designed to collect quantitative data on the seasonal progress in height growth of leaves and flower stalks of major species in the mixed grass prairie of western North Dakota. A summary of some of their data is included in this report.

### Procedures

From 1955 through 1962, Whitman and Goetz collected leaf and stalk height measurements for major graminoids. Plant heights were determined by measuring leaves and flower stalks of an average of 10 ungrazed lead tillers of each species to the nearest 1 cm. Measurements were collected at approximately 7- to 10-day intervals from early April to mid September. Leaf heights were measured from the ground to the tips of extended leaves. Flower stalk heights were measured from the ground to the tips of the inflorescences.

### Grass Height Growth

Goetz (1963) reported the average percentage of growth completed at sequential intervals. These percentages were based on the average maximum leaf and flower stalk heights. A summary of these data is shown in tables 1 and 2 and figure 1. Upland sedges complete 100% of their growth in leaf and flower stalk height by 30 June. Cool-season grasses complete 100% of their growth in leaf and flower stalk height by 30 July. Warm-season grasses complete 100% of their growth in leaf height and 91% of their growth in flower stalk height by 30 July. In warm-season grasses, a small amount of flower stalk elongation occurs after 30 July.

### Herbage Biomass

Peak aboveground herbage biomass is usually reached during the last 10 days of July. Herbage weight of ungrazed plants increases during May, June, and July. After the end of July, herbage weight decreases because the rate of senescence of the grass leaves exceeds the rate of growth. During senescence, cell material from the aboveground structures is translocated to the belowground structures; this movement results in a reduction in weight of aboveground structures.

### Precipitation Pattern

The seasonal distribution of northern mixed grass prairie precipitation occurs in the Plains Precipitation Pattern (Humphrey 1962), with most of it occurring during the growing season (85%) and the greatest amounts occurring in spring and early summer. The precipitation received during May, June, and July accounts for 51% of the annual precipitation (Manske 2000).

### Conclusion

The primary period of growth in graminoid leaf and flower stalk height and of accumulation in aboveground herbage weight occurs during the remarkably short period of May, June, and July, which coincides with the period of greatest precipitation.

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Table 1. Mean percent growth in leaf height completed by sample date for ungrazed plants of major graminoid species from western North Dakota mixed grass prairie.

	<b>15 May</b>	<b>30 May</b>	<b>30 Jun</b>	<b>30 Jul</b>	<b>30 Aug</b>	<b>30 Sep</b>
<b>UPLAND SEDGES</b>	<b>75</b>	<b>93</b>	<b>100</b>	-	-	-
Western Wheatgrass	54	69	92	100	-	-
Needleandthread	40	62	97	100	-	-
Prairie Junegrass	72	84	93	100	-	-
Plains Reedgrass	68	78	95	100	-	-
<b>COOL SEASON GRASSES</b>	<b>59</b>	<b>73</b>	<b>94</b>	<b>100</b>	-	-
Blue Grama	34	48	82	100	-	-
Prairie Sandreed	16	39	88	100	-	-
<b>WARM SEASON GRASSES</b>	<b>25</b>	<b>44</b>	<b>85</b>	<b>100</b>	-	-

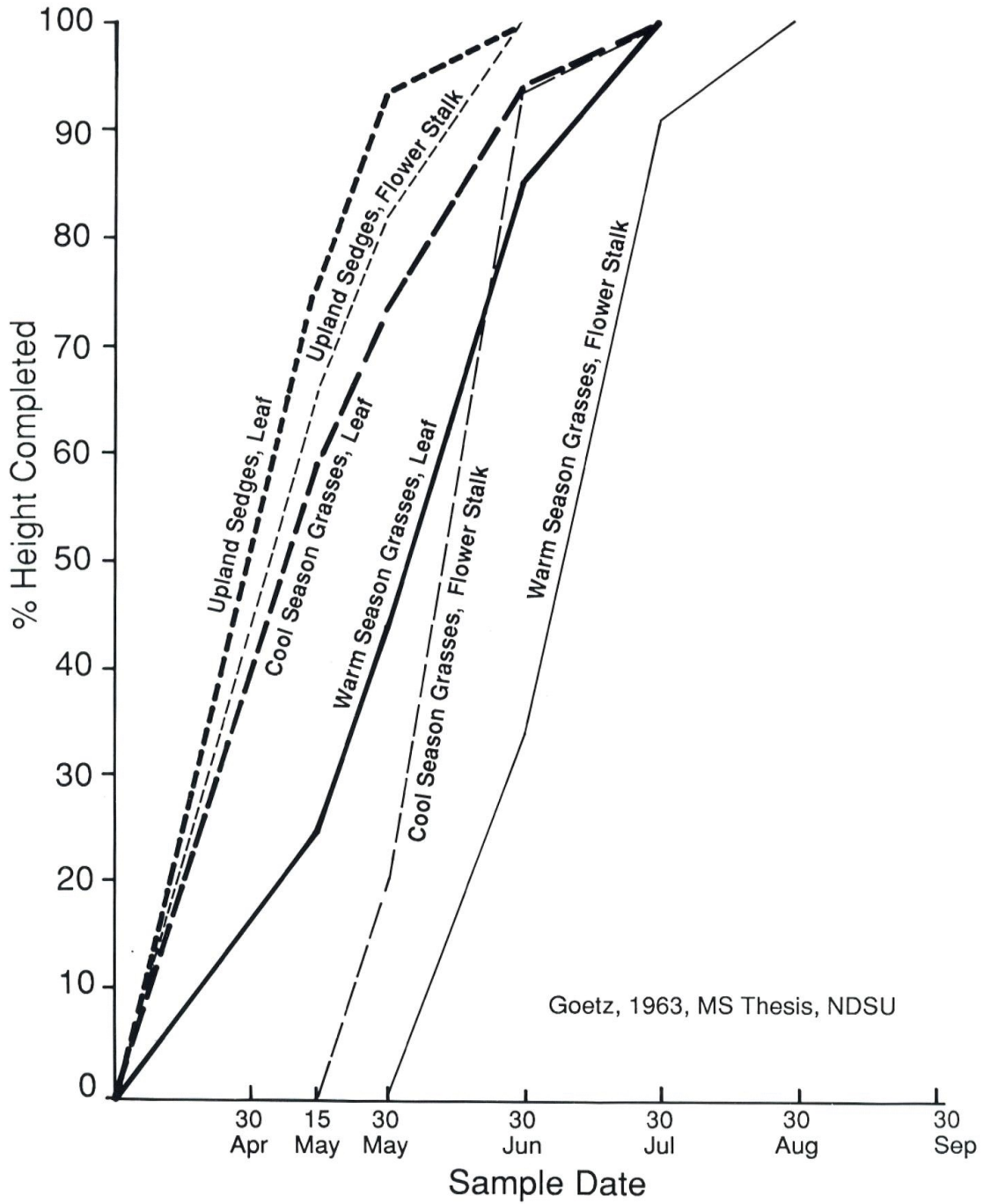
Goetz. 1963. MS Thesis. NDSU

Table 2. Mean percent growth in flower stalk height completed by sample date for ungrazed plants of major graminoid species from western North Dakota mixed grass prairie.

	<b>15 May</b>	<b>30 May</b>	<b>30 Jun</b>	<b>30 Jul</b>	<b>30 Aug</b>	<b>30 Sep</b>
<b>UPLAND SEDGES</b>	<b>66</b>	<b>82</b>	<b>100</b>	-	-	-
Western Wheatgrass	0	0	91	100	-	-
Needleandthread	0	39	85	100	-	-
Prairie Junegrass	0	42	100	-	-	-
Plains Reedgrass	0	0	100	-	-	-
<b>COOL SEASON GRASSES</b>	<b>0</b>	<b>20</b>	<b>94</b>	<b>100</b>	-	-
Blue Grama	0	0	68	94	100	-
Prairie Sandreed	0	0	0	88	100	-
<b>WARM SEASON GRASSES</b>	<b>0</b>	<b>0</b>	<b>34</b>	<b>91</b>	<b>100</b>	-

Goetz. 1963. MS Thesis. NDSU

# Percent Leaf and Flower Stalk Height Completed



**Fig 1.** Mean percent growth in leaf and flower stalk height completed by sample date from ungrazed plants of three categories of graminoids from western North Dakota mixed grass prairie.

### Literature Cited

**Goetz, H. 1963.** Growth and development of native range plants in the mixed prairie of western North Dakota. M. S. Thesis, North Dakota State University, Fargo, ND. 165p.

**Humphrey, R. R. 1962.** Range ecology. The Ronald Press Company, New York, NY. 234p.

**Manske, L. L. 2000.** Environmental factors to consider during planning of management for range plants in the Dickinson, North Dakota, region, 1892-1999. NDSU Dickinson Research Extension Center. Range Research Report DREC 00-1018c. Dickinson, ND. 36p.