GROWTH CHARACTERISTICS OF CRESTED WHEATGRASS, Agropyron desertorum (Fisch.) Schult., IN THE BIG SAGEBRUSH-BLUEBUNCH WHEATGRASS PROVINCE OF SOUTHEASTERN OREGON.

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Oregon State University, 1961

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Growth characteristics of standard crested wheatgrass were investigated at the Squaw Butte Experiment Station from 1955 to 1960. The primary purposes were to describe seasonal trends in growth and evaluate the effects of herbage removal at different seasons.

Growth rates were slow in April, increased in May, reached maximum in early June, decreased during June, and terminated in June or early July. The herbage was 6 inches tall about May 1; the heads were in boot development in late May and emerged in early June; anthesis occurred from June 25 to July 5; the herbage lost green color in July; and the seed were hard about July 20. Herbage yields and the duration of active growth depended largely upon the amount of precipitation.

Herbage dry-matter contents increased from 28 percent in early May to 74 percent in late August. Crude-protein contents decreased from 14 percent in early May to 3 percent in late August. Crude-protein yields were maximum about mid-June. Nitrogen translocation to underground parts was indicated by a significant negative correlation between concentrations in herbage and roots. The concentrations and yields of phosphorus and potassium followed seasonal trends that were chronologically similar to those for nitrogen.

Root growth was most active in April and terminated about June 1. Carbohydrate reserves accumulated in May, decreased slightly in June, and increased in July. Nitrogen fertilization resulted in the mobilization of carbohydrate reserves prior to head emergence.

Clipping at ground level a single time reduced root growth, herbage yields, and autumn-carbohydrate concentrations most when applied, respectively, in late-April, mid-May, and in mid-June. Timing herbage removal to cause strong effects upon herbage yields minimized the effects upon underground parts because (a) root growth was nearing termination; (b) carbohydrate stores were seasonally high; and (c) the strong yield reductions were in culm elongation and seed production.

Nitrogen fertilization increased percentage herbage-growth rates prior to mid-May. Increases in hay-stage yields attributed to fertilization accumulated largely in the period after mid-May. The early-season difference in percentage growth rates was called direct-nitrogen-response, which was associated with (a) carbohydrate mobilization, (b) higher contents of moisture, N, P, and K, and (c) a greater occurrence of reproductive differentiation in the growing points. Nitrogen fertilization would be of most value on areas grazed only after the heads-in-boot stage of development, because (a) maximum increases in forage would be obtained; (b) root growth and carbohydrate storage would be improved; and (c) the improvement in nutritive quality would be more likely to increase animal daily gains. Nitrogen fertilization could not be proposed for promoting either earlier grazing or heavier stocking rates prior to mid-May.

Information about the growth characteristics of crested wheatgrass was interpreted for basic concepts important in grazing management. To obtain an optimum amount of feed value per acre, grazing could begin at the heads-in-boot stage of development and terminate at anthesis. This proposal was termed one-crop grazing. To obtain an optimum amount of early use, grazing could begin at the 6-inch-leaf-height stage and terminate at the heads-in-boot stage. This proposal was termed two-crop grazing because proper timing and degree of utilization would stop growth in first-crop stems and permit second-crop growth composed of new tillers. To obtain an optimum length of grazing season, grazing could begin on pastures managed for two-crop grazing and alternate to pastures managed for one-crop grazing. This proposal was termed rotation grazing because it included rotation in the order of use among years. Microfilm $2.75; Xerox $8.00. 171 pages.

A microfilm or Xerox copy of the complete manuscript is available from the publisher, University Microfilms, Inc., Ann Arbor, Michigan, at the prices quoted at the end of the abstract.