TECHNICAL NOTES

GROWTH OF THE ANNUAL GRASS PLANT IN RESPONSE TO HERBAGE REMOVAL

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Study of the grass plant as an individual can lead to a better understanding of its behavior on the range. Too frequently results following treatment are evaluated without due regard to the effect of the treatment on the individual plant. This is particularly true in studies involving herbage removal by grazing or clipping.

The growth characteristics of grasses were reviewed recently by Rechenthin (1956) in relation to the utilization of the vegetation. Branson (1953) emphasized the importance in several perennial grasses of the position of the growing point in relation to ground level. Those species possessing elevated growing points which could be removed by grazing were less able to persist under increased grazing intensity. The response of crested wheatgrass to herbage removal was observed by Cook and Stoddart (1953). These investigators reported that a stem ceases elongation if it is cut below the uppermost node, and that a leaf, once unfolded, will not resume growth if grazed. Similar leaf behavior was reported for timothy by Evans (1927) who stated, ". . . the blade of a timothy leaf has completed its growth in length by the time that it has emerged from within the sheath of the leaf below it."

This paper reports responses to herbage removal of soft chess (*Bromus mollis*), a desirable annual grass. Planting was in 6-inch

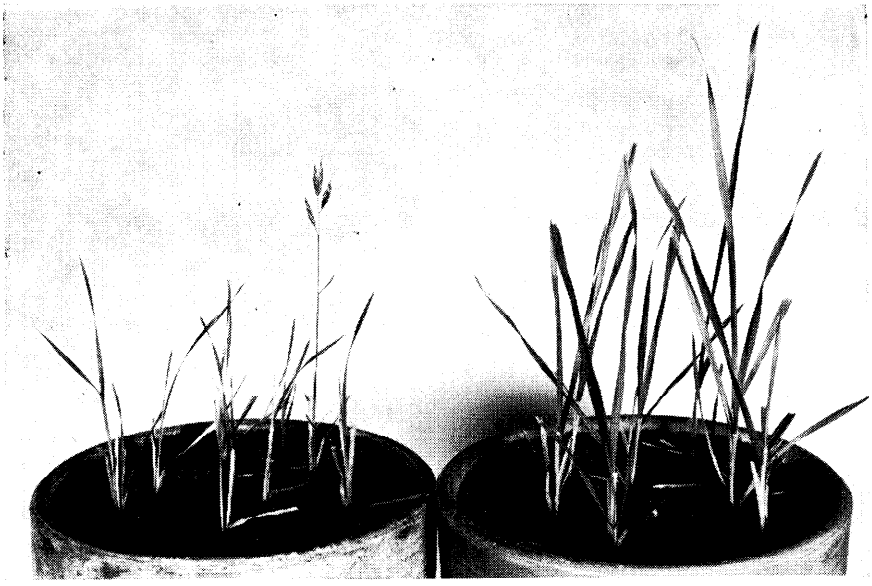

FIGURE 1. Soft chess plants 10 weeks old and 12 days after clipping. Terminal buds were removed by the clipping in the left-hand pot, but not in the other, the difference in terminal bud elevation being induced by photoperiod.

pots in the greenhouse. All clipping was at 1½-inch height. Whether or not the growing point of a stem was removed by clipping was determined by dissection of the cut tissue. Leaf lengths were measured directly from the base of the blade.

Results and Discussion

Leaf elongation was found to be complete by the time the blade was emerged from the subtending sheath. Following removal of tissue only the youngest leaf or leaves (those not fully emerged) continued elongation. The often stated view that grass leaves are regenerated from basal meristematic tissue must be qualified with reference to leaf age.

Removal of the entire terminal bud (immature inflorescence) of a culm results in the growth cessation of that shoot. If, however, a portion of the inflorescence is retained the shoot continues growth. After terminal bud removal from the main stem, continued development depends upon the initiation of tillers.

The plants in Figures 1 and 2 were photographed at 10 weeks of age and 12 days after clipping. In Figure 1 the stage of reproductive development was controlled by photoperiod. Those plants having elevated terminal buds which were removed by the clipping received three weeks of longer day-length than did the others. As the same number of plants are in both pots, a visual comparison of production is possible. Growth is faster from a cut shoot when the terminal bud is retained and the culm continues elongation, than when the bud is removed and growth is by tillering. In addition the tiller is smaller and lighter than the main shoot. It would appear that the stage of development of the plant as well as favorable temperature and moisture should be considered as contributing to the lush growth of annuals usually observed in the early spring.

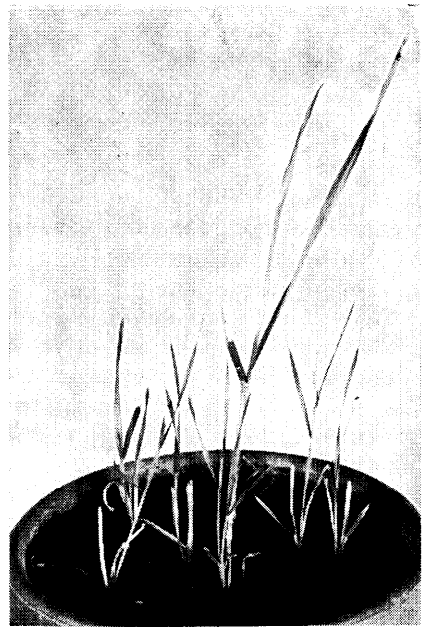

FIGURE 2. Only the large plant in this pot retained the terminal bud when clipped.

In Figure 2 only the larger plant retained the terminal bud. Leaf response to herbage removal is illustrated by this plant. The youngest leaf lost no tissue and is as yet incompletely emerged. The next older leaf lost the tip but continued elongation, being only partly emerged when cut. The third leaf was fully expanded when cut and the stub has not elongated. The stubs of culms from which the terminal bud was removed likewise have not elongated since being clipped.

These responses of the winter annual range grass are not unlike those of winter cereals. The latter are likewise winter annuals and are frequently pastured during the fall, winter, or early spring. To avoid a reduction in grain yields in cereals, grazing is discontinued in the spring when the terminal bud is elevated to a height that the animals may remove it. If the immature head is removed, new heads may be produced only on new tillers (Hubbard and Harper, 1949; Sprague, 1954). While reduction in grain yield is generally undesirable with cereals, seed reduction induced by late grazing of certain range annuals can be useful in the regulation of the species.

LITERATURE CITED

BRANSON, FARREL A. 1953. Two new factors affecting resistance of grasses to grazing. Jour. Range Mangt. 6: 165-171.

COOK, C. WAYNE AND L. A. STODDART. 1953. Some growth responses of

crested wheatgrass following herbage removal. Jour. Range Mangt. 6: 267-270.

EVANS, MORGAN W. 1927. The life history of timothy. U.S.D.A. Dept. Bull. 1450.

HUBBARD, V. C. AND HORACE J. HARPER. 1949. Effect of clipping small grains on composition and yield of forage and grain. Agron. Jour. 41: 85-92.

RECHENTHIN, C. A. 1956. Elementary morphology of grass growth and how it affects utilization. Jour. Range Mangt. 9: 167-170.

SPRAGUE, M. A. 1954. The effect of grazing management on forage and grain production from rye, wheat and oats. Agron. Jour. 46: 29-33.

SOME EFFECTS OF FIRE ON A PERENNIAL RANGE TYPE

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Loss of forage in wild-land fires is often an important part of the total fire damage. Evaluating this damage where perennial plants predominate requires estimates not only of the loss in grazing capacity but also of the time required for the area to regain its pre-burn capacity. To provide some guides to the effect of fire on one northern California perennial range type, study plots have been established in and adjacent to an area burned by a wildfire in August 1949 (Sheep Well Fire, Goosenest Ranger District, Klamath National Forest). Study of these plots is continuing, but the results to date provide some useful information on the changes in range vegetation.

FIGURE 1. Unburned plots in 1950. Predominant shrub is bitterbrush.

The plots were established in August 1950 in an area that had burned with moderate intensity. Five plots, each 5 feet by 50 feet, were established near the fire line inside the burn. Five similar plots were established across the fire line in an unburned area. They served as check plots, and it is reasonable to assume that they had vegetation of about the same composition and density as that on the burned plots before the fire. The unburned plots also provided a means of determining any long-term trends in general range condition not attributable to the fire.

The study area is typical north-

FIGURE 2. Close-up of burned plot in 1951. Light colored grass in background is cheatgrass.

[1] *The California Forest and Range Experiment Station is maintained at Berkeley in co-operation with the University of California.*