Response of Orchardgrass Clones to Clipping Frequency

Douglas R. Dewey

ORCHARDGRASS is a multipurpose grass, i.e., it is used both as a hay crop and in pastures. Often a single variety is used under various pasture-management systems as well as for hay or silage. Multiple use of a strain cannot be recommended unless that strain is superior to other adapted strains under each management system. Because of the wide differences among management systems, ranging from continuous grazing to hay production, it is questionable that one strain has sufficient flexibility to perform outstandingly under all common conditions of use.

Certain forage species are known to be better adapted to specific management practices than others. Many studies have demonstrated that species differ markedly in their relative response to defoliation (2, 3, 7, 13, 15, 18). Information from studies such as these serves as a guide in determining how each species should be managed and which species are suitable for given conditions of use. It has not been clearly established whether strains within species differ sufficiently in their response to differential management to warrant the development of different strains for use with given management systems.

Studies of the response of strains within species to simulated management practices have yielded variable results. Gross et al. (5) and Tysdal and Kiesselbach (17) reported striking differential responses of alfalfa varieties to frequency and time of clipping. Variety x clipping treatment interaction is so great that major shifts in ranking of varieties were effected by changing the clipping management. Tysdal and Kiesselbach (17) reported that "the response of Ladak to different times of cutting is so great that it may almost be said that this variety can be made the lowest or highest yielding in a series of standard varieties through change in the time of cutting." Gross et al. (5) found that Buffalo yielded well for hay and poorly for pasture, whereas A-224 behaved in the reverse. Vernal and Narragansett yielded well under both management systems. The changes in rank under the two cutting systems indicated that greater flexibility in cutting management may be afforded some varieties than others. Other studies have failed to demonstrate a variety x clipping treatment interaction. Jackobs and Oldemeyer (9) and Law and Patterson (11) have reported that alfalfa varieties performed relatively the same under different intervals and times of clipping. These apparent contradictions among different investigations may be the result of the particular varieties involved, the nature of the clipping treatments, or a combination of both.

Few studies of the response of strains within grass species to clipping have been reported. Lazenby (12) studied the response of five strains of Lolium perenne to clipping treatments that simulated hay and rotational-grazing management. He observed that the relative yields of the strains were almost identical under both management systems. Hanson et al. (6) studied the effect of 2 cutting heights on 13 apomorphic strains of Poa pratensis and reported no interaction of strains x cutting heights. It was speculated, however, that this interaction might have been more important if the two clipping treatments had differed more. Fortmann (4) reported a significant variety x clipping frequency interaction with smooth bromegrass. Varieties maintained their same relative rank under all clipping treatments, and the interaction was significant because differences among varieties became less as clipping frequency was increased.

The objective of the present investigation was to study the relative response of orchardgrass clones to clipping frequencies simulating continuous grazing, rotation grazing, and hay management; and thereby to provide information concerning the need of developing different varieties for specific management systems.

MATERIALS AND METHODS

Thirty orchardgrass clones of similar maturity were selected from the breeding nurseries at Logan, Utah. All clones were considered as desirable breeding stock and were the product of previous selection for their ability to produce under conditions of controlled interplant competition as described by Keller (10). A wide range of morphological forms including erect and prostrate clones were selected because growth habit may affect response to defoliation. Each clone was increased vegetatively to 120 clonal members in the greenhouse during the winter of 1956-57.

The clonal material was transplanted to the field between March 29 and April 6, 1957, on 6-inch centers so as to approach conditions of interplant competition normally found in a solid seeding. The experimental design was a randomized block split-plot arrangement with clipping treatments as main-plots and clones as subplotts. Each subplot consisted of a row of 5 clonal members of 1 clone. Main-plots were replicated eight times. A border was transplanted around the nursery.

The transplants established themselves quickly, and a perfect stand was obtained. Growth was rapid, and the plants were approximately 12 inches tall at the first clipping on May 27, 1957. At this time all plants were uniformly cut back to 1 inch with hand shears. Subsequent harvests were made in a similar manner. After the initial clipping, 3 clipping managements were put into effect as follows:

1. Plants clipped when 3 to 4 inches tall (simulating continuous grazing).
2. Plants clipped when 10 to 12 inches tall (simulating rotation grazing).
3. Plants first clipped when in head with aftermath cuts at 12-14 inches (simulating hay management).

These treatments were continued through 1957, 1958, and 1959. During this period 26, 12, and 9 harvests were made for management 1, 2, and 3, respectively. At each harvest, forage from each 5-plant subplot was bagged and oven-dried, and the weights were recorded in grams.

The nursery area was irrigated and fertilized as necessary during the experiment. Eighty pounds of N per acre was applied in the spring and late summer of 1958 and again in the spring of 1959.

For the variance analysis 5-plant plot yields totaled over 1 year provided the basic unit of observation. Years were included in the analysis as the sub-subplot of a split-plot arrangement.

RESULTS AND DISCUSSION

Management Effects

The differential effect of clipping managements upon forage yields was very pronounced, but not unexpected.