



Forage Research in Texas

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Nutritive Value of White Clover Varieties

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SUMMARY

Sixteen white clover varieties were evaluated for percent protein and in vitro digestible dry matter (IVDDM) during the spring-summer growing period. Protein ranged from about 30% in March to about 20% in mid-July. IVDDM declined slowly from about 80% in March to approximately 70% in mid-July.

Introduction

White clovers are grown in the eastern one-third of Texas on bottomland-type soils. Although the primary objective associated with white clover forage production is that of summer persistence and survival, the nutritive value of this clover as influenced by season is also useful information to the livestock producer. The primary objective of this trial was to monitor percent protein and IVDDM of selected white clover varieties throughout the growing season.

Procedure

Seventeen white clover varieties were seeded at the Texas A&M University Agricultural Research and Extension Center in a randomized complete block design with four replications. Plots were broadcast seeded at the rate of six lbs/acre in mid-October on a bottomland site containing a Thenas fine sandy loam soil. Inoculum (Type B) was applied to the seed pre-plant at 3X the recommended rate. Lime was applied at 1.5 tons/acre and plots were fertilized at planting with 24-96-96 lbs/acre of $N-P_2O_5-K_2O$, respectively. Plots were clipped to a 2.25 inch stubble with a rotary mower. Dry matter yields were determined and subsamples were taken for chemical analyses. Clover samples were analyzed for protein via micro Kjeldahl and IVDDM via modified Barnes technique.

Results and Discussion

Table 1 shows the monthly rainfall during the initial establishment year (79-80) and the data collection year (80-81). Although the total rainfall during 80-81 was less than the 13-year average, the precipitation that occurred during the May-July months was above normal, and primarily responsible for the extended forage production season. Forage dry matter harvested at monthly intervals is presented in Table 2 (1). Forage produced during this growing season was the result of clover survival during the previous year. Dry matter production during the year of establishment was about one-half that shown in Table 2.

Table 3 shows the influence of season on percent protein of the white clover varieties. Forage harvested on March 20 had more than 30% protein. Substantial decreases in percent protein occurred at the May 21 harvest and again at the July 16 harvest. However, since the absolute protein values remained at nearly 20%, this protein reduction due to chronological and physiological maturity would not be expected to detrimentally affect animal performance.

IVDDM of the clover varieties is presented in Table 4. The decline in percent IVDDM followed a similar trend to that of percent protein. Percent IVDDM ranged from slightly more than 80% on March 20 to about 70% on July 16. Both Fla. XPL and S.C. Nematode Tolerant had IVDDM values of approximately 80% on July 16; whereas, most of the other varieties had IVDDM values of about 70%. The May 21 harvest date produced most of the low IVDDM values during the measurement period. This may have been due to the relatively small amount of rainfall which occurred during the previous month; or it may have been due to advancing physiological maturity as evidenced by an increasing amount of flowering which occurred in early to mid-May. The quality of these forages, as represented by both protein and IVDDM, remained relatively high throughout the trial period and individual animal performance should be greatly improved over that performance obtained from forages such as warm-season perennial grasses.

Literature Cited

1. Smith, G. R., F. M. Rouquette, Jr., and E. R. Shipe. 1982. Forage production of red and white clover in East Texas.

Table 1. Precipitation by months at Overton, Texas for a two year period.

| Months | Years | | 13 year Avg. |
|-----------|------------------|---------|--------------|
| | 1979-80 | 1980-81 | |
| | -----inches----- | | |
| September | 6.6 | 3.2 | 4.7 |
| October | 2.4 | 1.9 | 3.7 |
| November | 4.3 | 3.5 | 3.8 |
| December | 5.1 | 1.5 | 3.3 |
| January | 3.6 | 1.0 | 4.0 |
| February | 2.6 | 2.8 | 3.3 |
| March | 2.6 | 2.8 | 4.1 |
| April | 4.3 | 2.0 | 4.7 |
| May | 6.1 | 7.8 | 3.9 |
| June | 2.1 | 4.7 | 4.0 |
| July | 1.3 | 5.4 | 2.9 |
| August | 0.9 | 0.7 | 1.9 |

Table 2. White Clovers Grown on a Prepared Seedbed.

| Entry | Harvest Date | | | | | Total |
|-----------------------------|--------------------|------|------|------|------|---------------------|
| | 3-20 | 4-13 | 5-21 | 6-12 | 7-16 | |
| | -----lbs DM/A----- | | | | | |
| Fla. XPL ² | 1343 | 1610 | 1412 | 1480 | 1329 | 7174 a ¹ |
| L8-100 ² | 1571 | 1457 | 1010 | 1408 | 1597 | 7043 ab |
| Lucky | 1583 | 1418 | 1109 | 1284 | 1613 | 7007 ab |
| L8-101 ² | 1511 | 1516 | 1084 | 1437 | 1435 | 6983 ab |
| Calif. Ladino | 1499 | 1501 | 1171 | 1309 | 1451 | 6931 ab |
| S.C. Med. ² | 1391 | 1424 | 1061 | 1479 | 1541 | 6896 abc |
| S.C. Nem. Tol. ² | 1535 | 1497 | 1133 | 1327 | 1386 | 6878 abc |
| Arcadia | 1343 | 1427 | 1152 | 1367 | 1526 | 6815 abcd |
| Tillman | 1499 | 1354 | 950 | 1187 | 1404 | 6394 bcde |
| K6-8 Ladino ² | 1367 | 1224 | 989 | 1192 | 1521 | 6293 cdef |
| Regal | 1223 | 1295 | 1022 | 1235 | 1468 | 6243 def |
| Sacramento | 1139 | 1302 | 1179 | 1161 | 1275 | 6056 ef |
| La. S-1 | 1355 | 1646 | 1477 | 1265 | 0 | 5743 fg |
| Nolin's Imp. | 1151 | 1678 | 1425 | 1206 | 0 | 5460 gh |
| Tamar | 1103 | 1572 | 1158 | 1133 | 0 | 4966 h |
| Rector | 1427 | 1282 | 1097 | 1041 | 0 | 4847 h |

C.V. = 62.2%

¹ Numbers within a column not followed by the same letter differ (P<.05) according to the Duncan's Multiple Range test.

² Experimental varieties or germplasm.

Table 3. Percent protein of selected white clovers during the growing season.

| Entry | Harvest Date | | | | |
|----------------|--------------|------|------|------|------|
| | 3-20 | 4-13 | 5-21 | 6-12 | 7-16 |
| Fla. XPL | 32.8 | 30.1 | 25.0 | 23.6 | 20.0 |
| L8-100 | 31.3 | 33.7 | 25.8 | 25.8 | 18.8 |
| Lucky | 32.5 | 29.4 | 26.8 | 24.1 | 21.2 |
| L8-101 | 34.8 | 28.9 | 28.4 | 25.8 | 21.5 |
| Calif. Ladino | 32.5 | 33.0 | 26.6 | 23.6 | 19.3 |
| S.C. Med. | 33.6 | 32.6 | 27.6 | 24.3 | 20.6 |
| S.C. Nem. Tol. | 31.6 | 32.5 | 29.0 | 24.6 | 21.1 |
| Arcadia | 31.5 | 34.5 | 25.9 | 23.3 | 18.8 |
| Tillman | 32.3 | 33.7 | 28.8 | 25.0 | 23.1 |
| K6-8 Ladino | 32.2 | 33.2 | 26.8 | 23.6 | 20.7 |
| Regal | 34.9 | 30.0 | 25.3 | 24.9 | 21.7 |
| Sacramento | 33.0 | 28.5 | 25.1 | 24.2 | 19.4 |
| La. S-1 | 30.4 | 31.2 | 22.4 | 22.6 | - |
| Nolin's Imp. | 32.6 | 29.5 | 24.0 | 21.1 | - |
| Tamar | 32.4 | 30.5 | 23.3 | 21.7 | - |
| Rector | 34.3 | 32.6 | - | 20.4 | - |

Table 4. Percent in vitro digestible dry matter of selected white clovers during the growing season.

| Entry | Harvest Date | | | | |
|----------------|--------------|------|------|------|------|
| | 3-20 | 4-13 | 5-21 | 6-12 | 7-16 |
| Fla. XPL | 83.3 | 74.4 | 71.8 | 69.8 | 80.7 |
| L8-100 | 80.0 | 74.3 | 71.0 | 77.6 | 75.9 |
| Lucky | 81.4 | 76.6 | 75.4 | 76.5 | 73.4 |
| L8-101 | 82.3 | 74.0 | 76.8 | 76.2 | 74.4 |
| Calif. Ladino | 84.5 | 75.3 | 65.3 | 75.4 | 67.9 |
| S.C. Med. | 82.9 | 72.8 | 70.8 | 73.6 | 67.1 |
| S.C. Nem. Tol. | 80.4 | 72.0 | 71.0 | 77.1 | 79.4 |
| Arcadia | 80.4 | 78.6 | 66.1 | 72.9 | 72.6 |
| Tillman | 81.7 | 76.5 | 72.0 | 75.9 | 68.8 |
| K6-8 Ladino | 82.3 | 73.7 | 68.1 | 74.9 | 72.6 |
| Regal | 79.5 | 74.3 | 68.6 | 74.5 | 72.8 |
| Sacramento | 81.9 | 73.0 | 66.6 | 71.0 | 74.6 |
| La. S-1 | 78.1 | 73.8 | 58.8 | 68.4 | - |
| Nolin's Imp. | 81.8 | 70.8 | 65.1 | 74.6 | - |
| Tamar | 81.6 | 68.1 | 66.9 | 69.3 | - |
| Rector | 79.4 | 73.5 | - | 66.8 | - |