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## SEASONAL PRODUCTION OF ANNUAL FORAGE LEGUMES AT OVERTON, 1983-1985

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### SUMMARY

Thirty-four annual clovers, including arrowleaf, crimson, subterranean, berseem, ball, and rose, were evaluated for forage production and adaptation at Overton in 1983-84. Twenty-seven annual clovers and six vetches were evaluated in 1984-85. 'Chief' crimson and 'Wilton' rose clover were the top forage producers in 1983-84, with yields of 4411 and 3878 lbs DM/acre, respectively. In 1984-85 'Meechee' arrowleaf topped the annual clover trial with 3100 lbs DM/acre. Vetch yields ranged from 3549 to 244 lbs DM/acre for 'Hairy' and 'Vantage', respectively. Ten rose clover experimental lines, in production trials for the first time, were all higher yielding than the three check varieties.

### OBJECTIVES

The objectives of these experiments were: 1) to determine seasonal distribution of annual forage legume dry matter production; and 2) to observe the general adaptation of annual forage legumes to East Texas soil and climatic conditions.

### PROCEDURE

Eighteen annual clovers were drilled into a native sod of common bermudagrass and Paspalum setaceum on October 14, 1983. Twenty-seven annual clovers and six vetches were drilled into a mixed 'Coastal' and common bermudagrass sod on October 11, 1984. Stands were lost in 1984 on 14 annual clovers, including arrowleaf, ball, berseem, and crimson, due to grasshopper and/or cricket damage. These clovers were replanted on November 12, 1984. A small-plot drill with six double disk openers, spaced nine inches apart, was used to place seed one-half inch deep in 5x7 foot plots. Fertilizer and lime were applied according to soil test (Table 1). The clovers were harvested at 2.25 inches and the vetch at 1.75 inches with a rotary mower.

Sixteen varieties or experimental lines of subterranean (sub) clover were established in 6x12 foot plots on a prepared seedbed

September 17, 1981. These plots were fertilized at planting and in the fall of 1982 with 0-20-20 at 450 lbs/ac. Summer growth of grass and weeds was removed prior to planting by mowing at 2 inches. In September 1983, fertilizer was applied according to soil test (Table 1). The sub clover was harvested with a rotary mower at 1.25 inches.

Seeding rates and Rhizobium inoculants for each legume species are shown in Table 2. Peat inoculant, supplied by the Nitragin Co., was applied at 1 oz. per pound of seed with Pelgel solution used as an adhesive to stick inoculant to the seed.

Each experiment was arranged in a randomized complete block design with 4 replications. At each harvest, forage samples were weighed, dried at 70°C for 48 hours and weighed again. Percent dry matter of the samples was used to calculate dry matter yield per acre.

### RESULTS

#### 1983-84

Total production in the sod-seeded annual clover test ranged from 4411 to 1189 lbs DM/acre for 'Chief' crimson and 'CH-N' crimson clover, respectively (Table 3). The annual clovers produced more in May with the exception of 'Autauga', 'Tibbee', 'Dixie' crimson, and 'Kondinin' rose clover which peaked in April. Tibbee, Autauga and Chief crimson were the highest yielding at the first harvest. Arrowleaf clover yields at Overton in 1983-84 were lower than expected. Total rainfall during March, April, and May 1984 was five inches below the 17-year average. This low soil moisture condition was a factor in reducing arrowleaf clover yields at the last harvest in May.

Production of sub clover varieties and lines in their second reseeding stand ranged from 3206 to 1349 lbs DM/acre for lines 209924 and 319145, respectively (Table 4). The reseeding sub clover test was harvested twice with P.I. 209924 and 'Woogenellup' as the highest producers during the March harvest. The experimental line 209924 produced more forage during both the 1982-83 and the 1983-84 seasons than in 1984-85.

In late December 1983 extreme cold temperatures were recorded (3 consecutive nights below 10°F). Performance of both the reseeding sub clover test and the newly established annual clover test was

diminished by these adverse conditions. However, even with these conditions, no clover lines in these tests were rated as winter-killed.

#### 1984-85

Total production in the sod-seeded annual clover test ranged from 3100 to 1866 lbs DM/ac for 'Meechee' arrowleaf and Autauga crimson, respectively (Table 5). Tibbee and Dixie crimson were the highest yielding at the first harvest. Although total production was lower than the last few years, possibly due to the later planting date, ball clover production was higher.

Forage production for the rose clover variety test ranged from 2617 lbs DM/ac for M-13 to 647 lbs DM/ac for 'Hykon'. M-13 and D-17 rose clover produced higher yields during the March harvest (Table 6). At the April harvest, the varieties Hykon and Kondinin were in full bloom, 'Wilton' was in partial bloom and the experimental lines were still vegetative or in the bud stage. These experimental rose clovers were developed at Overton with selection for improved forage production and late maturity. Although grasshopper damage caused stand losses in the 1984 annual clover test, no insect damage was noted on the rose clover lines in this test.

Total production for the vetch test ranged from 3549 to 244 lbs DM/acre for 'Hairy' and 'Vantage' vetch, respectively (Table 7). 'Cahaba White' was not included in the analysis due to cold damage and stand loss. Hairy vetch yielded the most during the first harvest while Woodford produced more at the May harvest. 'Nova II' and Vantage did not regrow after the March harvest.

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TABLE 1. SOIL pH, FERTILIZER, AND LIME FOR FORAGE LEGUME PRODUCTION TRIALS IN 1983-85

| Experiment                 | Year | Soil<br>Type | Soil<br>pH | Fertilizer and Lime           |                  |                 |      |
|----------------------------|------|--------------|------------|-------------------------------|------------------|-----------------|------|
|                            |      |              |            | P <sub>2</sub> O <sub>5</sub> | K <sub>2</sub> O | S               | Lime |
|                            |      |              |            | -----lbs/ac-----              |                  |                 |      |
| Annual clover <sub>1</sub> | 1983 | Sawtown      | 6.8        | 90                            | 90               | 0               | 0    |
| Reseeding sub <sub>1</sub> | 1983 | Bowie        | 7.1        | 90                            | 90               | 0 <sub>2</sub>  | 0    |
| Annual clover              | 1984 | Sawtown      | 5.9        | 72                            | 116              | 44 <sub>2</sub> | 2000 |
| Rose clover                | 1984 | Sawtown      | 5.9        | 72                            | 116              | 44 <sub>2</sub> | 2000 |
| Vetch                      | 1984 | Sawtown      | 5.9        | 72                            | 116              | 44 <sub>2</sub> | 2000 |

<sup>1</sup>Established in 1981

<sup>2</sup>Applied as K-Mag, supplied by Duval Corporation

TABLE 2. SEEDING RATES AND RHIZOBIUM INOCULANTS USED IN EVALUATION OF ANNUAL FORAGE LEGUMES

| Species                    | Seeding Rate | Inoculant Type <sup>1</sup> |
|----------------------------|--------------|-----------------------------|
|                            | --lbs/acre-- |                             |
| Arrowleaf                  | 14.3         | O                           |
| Ball                       | 3.6          | B                           |
| Berseem and Crimson        | 19.6         | R                           |
| Rose and Subterranean      | 19.6         | WR                          |
| Common Vetch               | 35.0         | C                           |
| Hairy and Big Flower Vetch | 25.0         | C                           |

<sup>1</sup>Supplied by the Nitragin Co., Milwaukee, WI. Applied at 1.0 oz. per pound of seed with Pelgel solution as an adhesive.

TABLE 3. SEASONAL PRODUCTION OF ANNUAL CLOVERS AT OVERTON, TX,  
1983-84

| Variety              | Harvest Date          |      |      | Total               |
|----------------------|-----------------------|------|------|---------------------|
|                      | 3-19                  | 4-12 | 5-11 |                     |
|                      | -----lbs DM/acre----- |      |      |                     |
| Chief <sup>3</sup>   | 564                   | 1914 | 1933 | 4411 a <sup>1</sup> |
| Wilton Rose          | 293                   | 1472 | 2113 | 3878 ab             |
| Autauga <sup>3</sup> | 797                   | 1752 | 915  | 3464 abc            |
| Tibbee <sup>3</sup>  | 872                   | 1595 | 838  | 3305 abc            |
| 287973 Rose          | 151                   | 1121 | 1978 | 3250 abc            |
| RRPS-5 <sup>2</sup>  | 265                   | 666  | 2123 | 3054 abc            |
| Dixie <sup>3</sup>   | 522                   | 1487 | 1029 | 3038 abc            |
| Kondinin Rose        | 548                   | 1241 | 1014 | 2803 abcd           |
| Meechee <sup>2</sup> | 117                   | 430  | 2249 | 2796 abcd           |
| Syn 4 <sup>2</sup>   | 174                   | 658  | 1891 | 2723 bcd            |
| Yuchi <sup>2</sup>   | 256                   | 659  | 1657 | 2572 bcd            |
| Syn 2 <sup>2</sup>   | 87                    | 489  | 1912 | 2488 bcd            |
| Syn 3 <sup>2</sup>   | 78                    | 650  | 1738 | 2466 bcd            |
| Amclo <sup>2</sup>   | 103                   | 756  | 1472 | 2331 bcd            |
| Segrest Ball         | 0                     | 392  | 1565 | 1957 cd             |
| Common Ball          | 0                     | 373  | 1500 | 1873 cd             |
| Bigbee Berseem       | 124                   | 360  | 751  | 1235 d              |
| CH-N <sup>3</sup>    | 175                   | 447  | 567  | 1189 d              |

C.V. = 21.1%

<sup>1</sup>Yields followed by the same letter are not significantly different at the 0.01 level using Student Newman-Keuls Multiple Range Test.

<sup>2</sup>Arrowleaf clover

<sup>3</sup>Crimson clover

TABLE 4. SEASONAL PRODUCTION OF RESEEDING SUBTERRANEAN CLOVER AT OVERTON, TX, 1983-84

| Variety               | Harvest Date          |      | Total               |
|-----------------------|-----------------------|------|---------------------|
|                       | 3-28                  | 5-14 |                     |
|                       | -----lbs DM/acre----- |      |                     |
| 209924                | 2132                  | 1074 | 3206 a <sup>1</sup> |
| Woogenellup           | 2040                  | 970  | 3010 a              |
| Tallarook             | 1683                  | 1233 | 2916 a              |
| Miss. Ecotype         | 1344                  | 1301 | 2645 a              |
| 239907                | 1213                  | 1363 | 2576 a              |
| 319146                | 1057                  | 1474 | 2531 a              |
| Nangeela              | 1259                  | 1175 | 2434 a              |
| 291917                | 768                   | 1629 | 2397 a              |
| 311499                | 744                   | 1571 | 2315 a              |
| 168638                | 636                   | 1586 | 2222 a              |
| 311498                | 660                   | 1455 | 2115 a              |
| 184962                | 858                   | 1230 | 2088 a              |
| 209927                | 588                   | 1350 | 1937 a              |
| Mt. Barker            | 578                   | 1392 | 1970 a              |
| 319145                | 463                   | 886  | 1349 a              |
| Nungarin <sup>2</sup> | 0                     | 0    |                     |
| C.V. = 18.4%          |                       |      |                     |

<sup>1</sup>Yields followed by the same letter are not significantly different at the 0.05 level using Student Newman-Keuls Multiple Range Test.

<sup>2</sup>Did not reseed in 1981-82. Not included in statistical analysis.

TABLE 5. SEASONAL PRODUCTION OF ANNUAL CLOVERS AT OVERTON, TEXAS, 1984-85

| Variety              | Harvest Date          |      | Total               |
|----------------------|-----------------------|------|---------------------|
|                      | 3-29                  | 4-30 |                     |
|                      | -----lbs DM/acre----- |      |                     |
| Meechee <sup>2</sup> | 643                   | 2457 | 3100 a <sup>1</sup> |
| Segrest Ball         | 609                   | 2353 | 2962 a              |
| Amclo <sup>2</sup>   | 551                   | 2310 | 2861 a              |
| Chief <sup>3</sup>   | 736                   | 2109 | 2845 a              |
| Common Ball          | 524                   | 2210 | 2734 a              |
| Yuchi <sup>2</sup>   | 761                   | 1962 | 2723 a              |
| Tibbee <sup>3</sup>  | 1129                  | 1483 | 2612 a              |
| Dixie <sup>3</sup>   | 941                   | 1597 | 2538 a              |
| Syn 2 <sup>2</sup>   | 392                   | 1937 | 2329 a              |
| Syn 3 <sup>2</sup>   | 381                   | 1681 | 2062 a              |
| Syn 4 <sup>2</sup>   | 429                   | 1578 | 2007 a              |
| Y1 <sup>2</sup>      | 405                   | 1477 | 1882 a              |
| Bigbee Berseem       | 405                   | 1464 | 1869 a              |
| Autauga <sup>3</sup> | 635                   | 1231 | 1866 a              |

C.V. = 22%

<sup>1</sup>Yields followed by the same letter are not significantly different at the 0.01 level using the Student Newman-Keuls Multiple Range Test.

<sup>2</sup>Arrowleaf clover

<sup>3</sup>Crimson clover



TABLE 6. FORAGE PRODUCTION OF ROSE CLOVER AT OVERTON, TEXAS, 1984-85

| Variety <sup>2</sup> | Harvest Date          |      |      | Total               |
|----------------------|-----------------------|------|------|---------------------|
|                      | 3-26                  | 4-16 | 5-14 |                     |
|                      | -----lbs DM/acre----- |      |      |                     |
| M-13                 | 824                   | 1546 | 247  | 2617 a <sup>1</sup> |
| F-20                 | 704                   | 1668 | 187  | 2559 a              |
| D-17                 | 801                   | 1383 | 214  | 2398 ab             |
| M-16                 | 629                   | 1510 | 163  | 2302 ab             |
| R-12                 | 501                   | 1388 | 309  | 2198 ab             |
| J-3                  | 534                   | 1511 | 118  | 2163 ab             |
| O-15                 | 531                   | 1310 | 207  | 2048 abc            |
| H-18                 | 495                   | 1300 | 188  | 1983 abc            |
| H-7                  | 398                   | 1345 | 238  | 1981 abc            |
| D-3                  | 465                   | 1275 | 136  | 1876 abc            |
| Wilton               | 292                   | 953  | 215  | 1460 bcd            |
| Kondinin             | 401                   | 637  | 87   | 1125 cd             |
| Hykon                | 299                   | 315  | 33   | 647 d               |

C.V. = 19.6%

<sup>1</sup>Yields followed by the same letter are not significantly different at the 0.01 level using the Student Newman-Keuls Multiple Range Test.

<sup>2</sup>Entries identified by letter-number combinations are experimental rose clover lines from the Overton clover breeding program.

TABLE 7. SEASONAL PRODUCTION OF VETCH AT OVERTON, TEXAS, 1984-85

| Variety                   | Harvest Date          |      | Total               |
|---------------------------|-----------------------|------|---------------------|
|                           | 3-26                  | 5-1  |                     |
|                           | -----lbs DM/acre----- |      |                     |
| Hairy                     | 1595                  | 1954 | 3549 a <sup>1</sup> |
| Woodford                  | 353                   | 2318 | 2671 a              |
| Vanguard                  | 414                   | 1039 | 1453 b              |
| Nova II                   | 466                   |      | 466 bc              |
| Vantage                   | 244                   |      | 244 c               |
| Cahaba White <sup>2</sup> |                       |      |                     |

C.V. = 24.4

<sup>1</sup>Yields followed by the same letter are not significantly different at the 0.01 level using Student Newman-Keuls Multiple Range Test.

<sup>2</sup>Not included in the analysis