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Technical Note: Persistence and yield of ladino white clover in southeastern Louisiana

MARK K. JOHNSON

The author is professor of wildlife, School of Forestry, Wildlife, and Fisheries, Louisiana Agricultural Experiment Station, LSU Agricultural Center, Baton Rouge 70803.

Abstract

Ladino white clover (*Trifolium repens* L.) is usually re-established annually for cool-season and early warm-season pasture improvement. Careful pasture management during summer can encourage persistence of stolons so that renovation and reseeding may not be needed for subsequent grazing. Ladino white clover might be manageable for both cool- and warm-season grazing if grass competition is controlled. Both cool- and warm-season yields of persisting ladino white clover exceeded that of new plantings by an average (± SE) of 180 ± 41%. Winter yields of persisting swards averaged 5,250 ± 350 kg/ha while those of new plantings were only 1,379 ± 182 kg/ha. Average standing crop of persisting and new plantings was 3,497 ± 724 and 2,500 ± 378 kg/ha, respectively, from June through September. Suppression of warm-season competition leading to ladino white clover persistence may produce economic and soil conservation advantages. The greatest advantage of managing for persistence appeared to be increased forage for winter grazing.

Key Words: legume, pasture renovation, *Trifolium repens*

Most covers used for cool-season pastures in the southeastern United States are annuals that flower in spring and die by early summer. Subsequent pasture production requires renovation to release competition and promote seedling survival (Johnson et al. 1987). Because of the humid environment and soft-seeded nature of many commonly available clovers, plants may not volunteer well due to early germination of seeds when competition from warm-season grasses is high. Therefore, additional seed is usually used with annual renovation to ensure reasonable production. A long-term result of this annual soil disturbance is soil erosion with subsequent lowering of pasture fertility.

White clovers may persist longer into summer months than other species (Baltensperger et al. 1984). I observed some swards of ladino white clover (*Trifolium repens* L.) that persisted all summer, providing good winter production the second year without renovation. These pastures were initially planted after intensive seed-bed preparation (5 diskings at 2-week intervals) to eliminate warm-season, sod-forming grasses. This observation was significant because white clover seedling vigor is low so that new plantings often do not produce adequate yields for grazing until spring. Producers often use clover species with higher seedling vigor when winter grazing is their primary objective. These species usually die earlier and produce less opportunity for early summer grazing. Therefore, I conducted experiments with ladino white clover to determine if summer persistence could be consistently achieved, to estimate warm-season grazing potentials, and to compare winter yields of new plantings with persisting swards.

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Materials and Methods

Study Areas

Field studies were conducted on the Blairstown and Shades Plantations in East Feliciana Parish near Clinton, La. Soils on the study areas are Tangi (Typic Fragiudults)-Oliver (Aquic Fragiudalfs) and Tangi-Lytle (Typic Paleudults) silt loams of the Loessil Hills Association. These are acid, gently sloping, and moderately well-drained upland soils of low fertility. Average pH of the surface soil at plot locations was 5.1, and levels of P_2O_5 and K_2O averaged 5 and 23 ppm, respectively.

Plot Preparation

During summer 1987, 25 plots (0.5 ha each) were prepared for fall planting by disking 5 times at 2-week intervals to kill sod-forming grasses (the first disking was done on 15 July). Dolomitic lime was added at 4,500 kg/ha (Peevy 1972). During late September, ladino white clover (var. Osceola) was seeded at 20 kg/ha with 300 kg/ha of 8-24-24 fertilizer and cultipacked to ensure soil contact. Fourteen of the plots were on the Blairstown Plantation and 11 were at the Shades Plantation.

During summer 1988, 5 additional plots were prepared on each property, as described above, and fertilized and seeded in September so that yields could be compared between new plantings and swards persisting into the second year. All plots planted in 1987 were mown above the clover in August 1988 to reduce weed competition and fertilized as before. Livestock were excluded throughout the study, but grazing by white-tailed deer (*Odocoileus virginianus*) kept all herbage at ground level.

In fall 1988, 3 exclosures (1 by 1 m) were randomly placed on each of the 35 plots to eliminate use by white-tailed deer, which were abundant at both sites. Herbage was clipped in a single 20 by 20-cm quadrat placed in each exclosure during late February 1989 to compare peak winter standing crops. Exclosures were moved about 3 m and sampled again in May to compare spring standing crops. These herbage clippings represented regrowth following grazing by deer. The process was repeated monthly thereafter to evaluate summer production and persistence. All herbage clippings were placed in paper bags and oven dried at 60° C for 24 hours before weighing.

Data collected from the 3 quadrats per plot were averaged to give a mean yield per sampling date and plot. Means between

treatments were statistically compared using normal variates rather than the Student's t distribution (Mood et al. 1974). Otherwise, statistical comparisons between means were calculated in a manner similar to procedures used for Student's t tests. Data presented are means and standard errors of the means.

Results and Discussion

Although the last measurements were made in 1989, all plots persisted through spring of 1991. There were no significant differences in mean ladino white clover standing crops between Blairstown and Shades study locations for persisting swards, for new plantings, or for any sampling date ($P>0.2$). Therefore, mean standing crop estimates were averaged across locations. Persisting swards produced significantly more forage ($P<0.05$) than new plantings, especially considering winter standing crops (Table 1).

Table 1. Mean (± SE) oven-dry yields of Osceola ladino white clover from February to September 1989 in East Feliciana Parish, Louisiana, averaged across study locations. Persisting plantings (n = 25) were seeded in September 1987 and new plantings (n = 10) were seeded in September 1988.

Month of Sampling	New Planting	Persisting Planting
	---------- (kg/ha) ----------	
February	1379 ± 182	5250 ± 350
May	4963 ± 578	7665 ± 698
June	3394 ± 311	4761 ± 403
July	1954 ± 199	2416 ± 356
August	2859 ± 408	4729 ± 628
September	1795 ± 310	2080 ± 619

In February, persisting swards produced about 3.8 times more forage than new plantings. Production peaked in spring with more than 3,000 kg/ha and more than 2,000 kg/ha for persisting and new swards, respectively. Summer production of persisting swards ranged from about 1,000 kg/ha to more than 2,000 kg/ha for persisting swards. Although summer standing crops were consistently higher for persisting swards compared to new plantings, they were not significantly different for July and September ($P>0.2$), the driest months. For the months of June and August, persisting swards produced about 50% more ladino white clover than the newer plantings ($P<0.1$). Apparently, the longer-established stolons were able to take better advantage of the limited moisture.

Although a variety of warm-season annual legumes are adapted to the southeastern United States, few warm-season perennial legumes are available, and there is a great need for persitent perennial species (Ball et al. 1991). The unexpectedly high second-year summer yields of persisting ladino white clover could be of significant importance. Ladino white clover might be used for both cool-and warm-season grazing under appropriate management, and this could represent significant savings to livestock producers from both economic and soil conservation aspects. Regardless of summer grazing potentials, the value of second-year winter clover production provides a substantial economic advantage considering elimination of costs for seed and disking, and the dramatically increased forage production. Based on the cost for new plantings compared to maintenance of persisting swards (≈ $566/ha vs. $134/ha, respectively, Johnson and Dancak 1993), the cost of ladino white clover for winter grazing was $0.41/kg for new plantings and about $0.03/kg for second-year persisting swards. Although this represents a dramatic difference, an accurate comparison for any individual producer would require consideration for lost opportunity if warm-season use was deferred, and any additional costs required to manage for persistence of the ladino white clover.

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