poultry manure-tankage products we publish this article by Mr. Brown, of the Bureau of Chemistry and Soils, United States Department of Agriculture. There are at least two such by-products of the poultry slaughter-house business which are commonly used on golf courses, namely, *Bestivall* and *Premier Brand*.—EDITORS.]

Bur Clover as an Adjunct to Bermuda Grass Fairways

By Henry P. Smith

Eight years ago, when the land was purchased and cleared for the Spring Lake Country Club course at Waco, Tex., we had expected that a large part of the tract was sandy loam in character, but it developed that it varied considerably, running from sandy to gravelly, and a large part of it stiff or hard clay when dry, or a puddled, tight soil—"buckshot," as they call it in this country. The fairways, after planting, were heavily coated with stock manure, which developed a fair growth of Bermuda grass, but they were still quite hard, and thin in places.

Bur clover patches on the course of the Spring Lake Country Club. In the background, along the wooded stretch, is seen the line of the 12th fairway, which is a solid strip of Bermuda grass occupied by bur clover in the winter and early spring. The patchy area in the foreground will in all probability be completely covered by bur clover the following spring

I noticed patches of clover of various kinds that appeared to reseed annually, dying down in the spring. Wherever these patches appeared the Bermuda grass came up through them in the spring healthier and more vigorously than elsewhere, and there was a distinct softness or cushion effect to the feet when walking over these areas. I concluded that this might be a solution of our difficulties; and looking into the various varieties of clover that might be best for the purpose I decided upon bur clover, as it not only appeared to yield a maximum amount of nitrogen, but its extensive root system would

have a tendency to aerate or renovate these tight soils as well as add humus to the soil. A valuable addition, however, would be derived from the subsequent cuttings.

We have a limited water supply, barely sufficient to maintain our 18 greens in good condition throughout the long, hot summer months, and were it not for the annual contribution of humus, nitrogen, and renovation of the bur clover, it is doubtful if the grass could go through the very dry and hot summer without severe deterioration. With an adequate water system, which we hope to install in the very near future, we will have fairways second to none in the South.

While my experience in the East in respect to golf course upkeep would make me very shy of introducing any kind of clover in the fairways, particularly on sandy soils, nevertheless I believe that many of our southern courses could be considerably improved by treating them in the same manner as we have done, particularly those that are of hard clay or with very poor soil conditions.

Some varieties of clover grow better in the South than others. They are, or should be, extensively used as cover crops, and they make excellent pasturage, particularly when combined with Bermuda grass, providing all-year grazing. Bur clover comes in the fall and winter, when the Bermuda grass turns brown after the first frost, and disappears in the spring when the Bermuda grass starts growing. Thirty to fifty per cent of the fertilizing value of bur clover is in the roots and stubble, the nitrogen being taken from the air and deposited in the nodules (wart-like lumps on the roots). A good crop of clover should add the equivalent of not less than 200 pounds of nitrogenous fertilizer to an acre annually.

The inoculated seed should be sown broadcast in the early fall, using from 12 to 18 pounds to the acre. If seed in the bur is used, 20 to 30 pounds to the acre should be sown. If the seed is sown after the middle of August it is not a bad idea to boil the seed one minute, which tends to soften the seed coat and aid in rapid germination. The seed must, however, be inoculated after boiling. It can be sown in July, August, September, or October, and will come up when conditions are favorable.

Bur clover will grow on any type of soil, and can be depended upon to add humus and nitrogen to the soil annually without sacrificing the regular summer crop at the farm, and is the cheapest legume that serves as a winter cover crop. It does not require reseeding, but perpetuates itself if given half a chance. It is also splendid to plow under as a green-manure crop.

There are a number of varieties of bur clover obtainable from seedsmen. The majority of the clover areas on our course are of California bur clover (*Medicago hispida*). Interspersed through these patches we also have the Southern bur clover (*Medicago arabica*), which is very similar in all particulars, with the exception of a brownish center to the leaf, some spots small and some considerably larger.

[California and Southern bur clovers grow almost equally well between the 91st and 100th meridians. This belt divides the western area, for which the California species is most suitable, from the eastern area, which is more favorable to the Southern bur clover. Bur clover will not thrive on soils deficient in lime; hence, before attempting to grow clover in the Southeastern Coastal Plain and Florida, it would be necessary to supply this need.—EDITORS.]