Cheaper Nitrogenous Fertilizers Possible

"In the last few years the impending shadow of competition has forced new improvements and economies in the Chilean industry," said Dr. F. G. Cottrell, chief of the fertilizer and fixed-nitrogen investigations of the United States Department of Agriculture in a recent address before the National Fertilizer Association, as he discussed the control of nitrate prices by the Chilean producers of nitrate of soda. This control, Dr. Cottrell explained, has existed now for almost a century, since during that time the nitrate of soda fields in Chile have been the cheapest and by far the most abundant supply of the world's requirements of this fertilizer. The impending competition which promises to lower the prices of the Chilean monopoly is the steady development of the artificial fixation of atmospheric nitrogen.

"Competition from artificially fixed nitrogen," continued Dr. Cottrell, "came first from Norway, with the inauguration of the arc process about 1905. Then about 1911 the cyanamide process began appreciably to outstrip the arc process. Limitations of this process, however, militate strongly against the possibility of its ever achieving a large enough tonnage or a low enough cost to justify it in attempting to wrest price control from the Chilean producers.

"Significant developments, however, followed progress in a group of processes designated as the direct synthetic method of ammonia production. These processes consist in passing a mixture of three volumes of hydrogen and one of nitrogen over a so-called catalyst; that is, a substance remaining itself essentially unchanged but causing these two gases to react chemically so as to form ammonia.

"Although the nitrogen interests us primarily, the hydrogen is by far the more expensive constituent in the mixture. Hence the production of synthetic ammonia by plants operating commercially on hydroelectric hydrogen still encounters limitations with regard to the availability of cheap electric energy, although a number of plants enjoying favorable power conditions can operate profitably.

"Fortunately we have other methods far less sharply limited in their possibilities. New technical developments have opened practically unlimited opportunities for expansion as regards availability of energy and raw material. Most of these new methods extract hydrogen from water by combining the oxygen in the water with some other element.

"Our own war-time attempt at building a direct synthetic ammonia plant, namely plant No. 1 at Muscle Shoals, was based on this process. The synthetic ammonia plant of the Atmospheric Nitrogen Corporation, at Syracuse, N. Y., is a direct lineal descendant of Muscle Shoals plant No. 1. The Syracuse plant began after the war on the basis of experience and development furnished at Muscle Shoals with an initial rated plant capacity of about 15 tons of nitrogen a day, or about half that of nitrate plant No. 1. It has been steadily developed, and its output is now several-fold greater than it was originally.

"The nitrogen problem has come to revolve about fuel in general, and coal in particular. As this raw material is abundant and widely distributed, a broadly competitive nitrogen fixation industry will almost inevitably develop. This industry, from its scope and relative absence of limitations on its raw materials—air, water, and coal—

must of necessity supersede Chilean sources as the arbiter of price levels in the world market for nitrogen.

"This is not meant to imply that Chilean production will cease or even sink to insignificant proportions. It may, in fact, actually increase, but the significant point is that it will have to follow and adjust itself to the world price level established by the attainable costs in synthetic production, instead of being able itself to determine this level solely with respect to existing Chilean deposits, traditional methods of operation, local labor costs, and the Chilean Government's necessity for revenue."

Although from a fertilizer standpoint the interests of golf clubs are chiefly centered in sulphate of ammonia, which is a byproduct of the coal gas and coke industries, the price of sulphate of ammonia was "always indirectly fixed by that of sodium nitrate," explained Dr. Cottrell. The anticipated decreasing costs in the artificial fixation of atmospheric nitrogen will therefore indirectly tend to lower the price of sulphate of ammonia.

Shade grasses.—In the north the best shade grasses for turf are red fescue, fine-leafed fescue, and rough-stalked bluegrass (*Poa trivialis*). The first two are especially desirable for sandy or gravelly soil, but if sown alone they succeed even in clay. The last is generally the best in clays or loams. In the south the best shade turf is made by St. Augustine grass; this grass is started from stolons, as seed is not on the market.

A Golf Course Without a Water System

By W. C. Capron

The problem which we have been obliged to face at the Anaconda Country Club is not an ordinary one. To understand the conditions here it will be necessary somewhat to describe our community. Anaconda, Mont., is a town of 10,000 to 11,000 inhabitants. The only industry is a large metal reduction works employing about 3,000 men. This means that we are all working men and comparatively few receive more than modest recompense for our services; therefore the Country Club fees have had to be kept low or the membership would be extremely small. The Country Club was started 10 or 11 years ago, and the fees adopted at that time still maintain. They are: resident membership, $25 initiation, $20 per year dues; non-resident membership, $12.50 initiation, $10 per year dues; women's membership, no initiation, $10 per year dues.

It was a struggle to keep alive up to about five years ago. Since then the club has been forging ahead rapidly; the course has been changed from 9 to 18 holes and many improvements made. At the present time the total amount we are able to spend on the golf course for both upkeep and improvements is around $1,500 per year. With so small a sum, major improvements are impossible and we must use sand greens. We can not put in an irrigating system for our fairways. These considerations made it imperative that we find a grass which would grow without irrigation, other than that obtained from nature; one which would form a continuous turf, would not winterkill, would grow on bare gravelly soil, and would spread.

The two grasses most common in this region are blue joint and