Seed is not used on the putting greens. Velvet bent sod is taken from the fairways when patching is necessary; and these occasions are rare.

On steep hillsides subject to wash, the use of sod is the only solution on our soil. This takes time, and is expensive; but the result is immediate and usually permanent.

Controlling Fairway Weeds with Sulphate of Ammonia

By Joseph Valentine

Sixteen years ago the fairways of the east course of the Merion Cricket Club, Haverford, Pennsylvania, were seeded with a mixture of Kentucky bluegrass and South German mixed bent. The following year the fairways of the west course were seeded with the same mixture. Our fairway fertilizing program then included the application of bone meal, mushroom soil, nitrate of soda, and some limestone especially where we believed the soil to be acid. In 1920, eight years ago, our fairways were covered with crab grass, goose grass, and clover. In the latter year we discontinued the use of nitrate of soda, and in its place began the use of sulphate of ammonia. The weeds in the fairways have since been reduced about 80 per cent, and the clover almost 90 per cent. In fact, there is practically no crab grass in our fairways at this time. We expect to have all the weeds and clover completely eradicated within the next few years.

This year, for the first time, we have also used activated sludge on our fairways mixed with arsenate of lead at the rate of 500 pounds of the sludge and 40 pounds of arsenate of lead per acre. The arsenate is used as a grub control and also to eliminate chickweed, which has started to appear prominently on some of our fairways. Last year we used arsenate of lead on our putting greens, applied mixed in top-dressing at the rate of 2 pounds per 1,000 square feet of surface. We did not have to remove a single plug of chickweed from the greens, as had been necessary previous years, and very little of the so-called fall grass appeared on the greens.

Briefly, our present fertilizing program for the fairways is as follows: Late in the fall, in November or December, we top-dress the fairways with mushroom soil. Early in spring, about March, we apply sulphate of ammonia at the rate of 150 pounds per acre. Late in May the activated sludge mixed with arsenate of lead is applied. The first rainy day in July or August another application of sulphate of ammonia is made, and about the middle of September still a third application. The sulphate of ammonia is broadcast by hand, often mixed in compost to give more bulk. In making the midsummer and September applications during periods of rain, the men are sent out in raincoats. The rain washes the chemical off the leaves of the grass and into the soil, and thus prevents burning of the turf. This method does not affect the play on the course since the top-dressing is applied when the course is least used. The cost of the top-dressing, including the material, screening, hauling, and spreading, is about $3.75 per ton. The sulphate of ammonia is applied at the rate of 150 pounds per acre. The analysis of the activated sludge is moisture 3.02, nitrogen 6.17 (equivalent to ammonia 7.49), and phosphoric acid 2.03. We fertilize only the areas of the fairways which are most used, such as where the drive is supposed to drop, and the approaches to the put-

ting greens; that is, we start at about 150 yards from the tee and fertilize up to about 275 yards, and then about 50 yards on the approaches to the putting green. The soil on our east course is a clay loam, and on the west course a sandy loam. We discontinued the use of lime in 1916, but have continued using mushroom soil since 1915.

Fortunately we have no real bad slopes on our course, although we did have some bad spots on some of our sloping fairways on the west course, which required fertilizing to the extent of twice as much as on the flat fairways. We however have some shaded spots, which we seeded with rough-stalked bluegrass (*Poa trivialis*). This grass makes a good turf under shade conditions, when fertilized in the same way as our other fairway turf.

With new plantings on the fairways and tees we generally use the same method of fertilizing as outlined above, except that the areas are top-dressed more frequently, and the activated sludge is applied at the rate of about 500 pounds per acre mixed with about 100 pounds of acid phosphate.

All our tees are treated the same as the fairways, except that we can water the tees, but not the fairways at the present time. We are contemplating irrigating the entire east course, when we should be able to keep our famous course in perfect condition during the summer months. We believe that with irrigation we shall not have to wait anxiously for rain in order to apply the sulphate of ammonia or other chemicals such as are used in the checking of brown-patch, in order to prevent burning of the turf. We also have reason to hope that with irrigation a great percentage of annual bluegrass (*Poa annua*), which has gradually invaded much of our fairway turf, will survive the summer months, inasmuch as where the sprinkler reached last year nearly all of this desirable grass lived through the summer.

The Fairway Problem on an Alkaline Soil

By John MacGregor

Our main fairway problem at the Chicago Golf Club, near Wheaton, Illinois, seems to be a fight for the control of weeds and clover. The black gumbo soil on which our course is built is of a high lime content, and a factor which tends further to increase the alkalinity of the soil is the lime in the water used for irrigation. Three years ago we started using a commercial fertilizer which we regarded as suitable for counteracting the alkalinity of the soil, and although we realize that it will be a slow process to accomplish this purpose under our particular conditions, covering no doubt a period of several years, we are encouraged to believe that we are working in the right direction. The analysis of the fertilizer we use is 12 per cent nitrogen, 6 per cent phosphorus, and 4 per cent potash. Until now there has hardly been any noticeable difference in the growth of weeds and clover on our fairways, except that this spring the leaves of the clover seem to be smaller than usual.

In addition to the use of fertilizer to counteract the alkalinity of the soil, we have adopted the plan of maintaining a creeping bent and fescue nursery for fairway purposes so as to supply us with turf with which to replace the clover. This nursery was started three years ago, and we found the move to be a wise one. The year after