Sulphate of ammonia	0	.7	38.5	79.8	111.3
Sulphate of ammonia plus 23 lbs. limestone per thousand feet	0	2.0	53.5	88.2	79.5
Liquid ammonia	0	4.8	54.9	107.4	111.3

Soil No. 2—Infertile sandy loam. pH value of soil was 5.3, and with lime added, 6.05. Other conditions same as above.

Source of nitrogen	Per cent nitrogen changed to nitrate in 4 Days	6 Days	10 Days	14 Days	17 Days	22 Days
Cottonseed Meal	0	0	0	0	2.0	3.3
Castor Pomace	1.0	1.6	2.0	.8	3.1	5.1
Urea	0	0	0	1.0	4.0	18.5
Dried Blood	0	0	.8	0	1.0	2.7
Milorganite	0	1.4	.7	0	1.3	3.5
Grass Clippings	1.0	.8	.9	0	2.8	13.7
Sulphate of ammonia	0	0	0	0	0	0
Sulphate of ammonia plus 92 lbs. limestone per thousand feet	1.9	1.3	4.1	6.4	18.7	62.4
Liquid ammonia	0	0	0	1.1	7.0	22.3

Soil No. 3—Fairly fertile sandy loam. pH value 6.0.

Per cent nitrogen changed to nitrate after 12 Days	14 Days	16 Days	18 Days	21 Days	24 Days	30 Days
Cottonseed Meal						
0	0	2.05	6.4	4.5	8.9	5.9
Castor Pomace						
.4	2.6	10.8	19.6	28.6	26.7	31.1
Urea						
1.2	1.2	15.3	12.6	34.5	43.4	46.7
Dried Blood						
0	.6	9.19	13.5	27.4	26.7	32.3
Milorganite						
2.56	2.49	7.66	14.1	23.4	25.4	34.0
Grass Clippings						
6.37	8.77	17.1	23.8	38.2	36.9	46.7
Sulphate of ammonia						
0	0	0	0	0	0	6.3

In this experiment 30 milligrams nitrogen were added per 100 grams of soil. Such a large amount of nitrogen probably accounts for the poor showing of sulphate of ammonia. The behavior of grass clippings indicates that they have considerable value as a source of nitrogen.

Nitrate Accumulation In Wooster

Source of nitrogen	Per cent nitrogen change to nitrate after 21 days with varying moisture in the soil % water in soil 23	28	33	38
Sulphate of ammonia	112	118	93	27
Nitrate of Soda	110	115	91	54
Dried Blood	82	81	61	7
Cottonseed Meal	69	69	43	5
Activated Sludge	66	66	60	4
Alfalfa Hay	60	62	56	6
Muck	39	39	39	5
Garbage Tankage	26	28	20	5
Calcium Cyanamid	7	6	6	5
Horse Manure	4	4	3	4

This soil was made neutral by adding lime. 20 milligrams nitrogen were added per 100 grams soil.

Several things in these tables may be mentioned as outstanding. First—The acidity of soil 2 (Mass.) has definitely prevented the accumulation of nitrate nitrogen without lime added. Even when liquid ammonia was added the neutralizing effect was not enough to induce the accumulation of nitrates. The lime added with sulphate of ammonia was thoroughly mixed with the soil, yet in spite of this mixing nitrates did not accumulate for sometime. How much longer would it require for lime, applied as a top-dressing and inadequately mixed with the soil, to give a response in terms of nitrates produced?

Second—Manure should be considered as typical of the materials with a low nitrogen and high carbon content. The behavior as regards nitrate accumulation is also typical. Very little nitrates are produced, or at least accumulated, and if plants were growing on the soil they would undoubtedly suffer from lack of nitrogen. Garbage tankage behaves similarly. Other tests show that the nitrogen availability in garbage tankage is very low.

Third—The effect of too much water in soil in the experiment by Bear is plainly evident. The 38% water content is probably higher than most soils can carry under playing conditions. No doubt the available nitrogen in many greens is lost because of poor drainage, and occasionally because of overwatering. Even when nitrates are added to the soil as nitrate of soda or similar material, the nitrates disappear under the influence of too much water.

Minnesota Short Course

The University of Minnesota's short course for greenkeepers, which was held February 15-17 was very successful. There were fifty-six registrations, which included one from Wisconsin, five from North Dakota and five from Iowa.

Every subject connected with greenkeeping was covered as far as the short time would permit. Doctor Monteith, of the U. S. G. A. Green Section lectured each day. He described very clearly the grasses for greens and fairways, and told about plant diseases and their control.

There were several speakers on the important subject of "Soils," and the various kinds were well described and analyzed. Mechanical engineers covered the subject of equipment, while other experts discussed trees and landscaping, drainage and irrigation, golf course architecture, and maintenance costs.

It was suggested that next year's course should be continued for a week.