

# Fertilizers Give Differing Results In Section's Test Gardens

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**T**HE DEMONSTRATION turf gardens of the Green Section, located for the past 5 years on golf courses in various U. S. localities, have offered an excellent opportunity to test the effects of different fertilizers on grass growing on different types of soil under different climatic conditions. The gardens, as described in a recent article in GOLFDOM, contain a series of 15 plots for the testing of fertilizers on turf maintained at putting green length. Eleven of these plots were fertilized at monthly intervals from April to September with materials supplied by the Green Section. Four of the plots received no fertilizer. These latter were "check plots," so situated that every fertilized plot was beside an unfertilized check plot. This arrangement made it possible to observe readily the actual improvement of the turf resulting from the use of a fertilizer by comparing it with the adjacent turf which depended entirely on the supply of plant food in the unfertilized natural soil.

The putting green fertilizer tests were made on German mixed bent turf, with the exception of the garden at the Country Club of Virginia, where Metropolitan creep-

ing bent was used. Rates of application were figured on a nitrogen basis. Quantities used for a full-strength application contained 1/10 lb. of nitrogen for a plot of 100 sq. ft. This is at the rate of 1 lb. of nitrogen to 1,000 sq. ft., which is the amount carried in 5 lbs. of sulphate of ammonia, in 16 2/3 lbs. of the complete fertilizer with an analysis of 6-12-4, or in 33 1/3 lbs. of bone meal analyzing 3 per cent of nitrogen. During July and August, rates of applications were cut in half to reduce danger from burning. Therefore in six applications during the year each fertilized plot received 1/2 lb. of nitrogen (5 lbs. to 1,000 sq. ft.). Knowledge of the relative effects of different fertilizers, when compared on the nitrogen basis, enables anyone to determine by simple arithmetic the values of fertilizers according to his local conditions.

## Type of Mixed Fertilizer Used

The complete mixed fertilizers used in the tests contain sulphate of ammonia, phosphate of ammonia, superphosphate, muriate of potash, and sand. No organic material was used in their preparation. The sand was used as an inert filler to add weight to make up the desired propor-

TABLE 1  
Putting Green Fertilizing Ratings, on German Mixed Bent Turf  
Green Section Demonstration Gardens

	1929	1930	1931	1932	1933	5 Years' Aver. %
6-12-4 .....	82	84	82	88	84	84
12-6-4 .....	84	82	81	86	82	83
Sulphate of ammonia .....	82	78	79	76	73	78
Phosphate of ammonia .....	80	80	74	77	77	78
Activated sludge .....	73	71	72	72	73	72
Poultry manure .....	76	69	66	77	70	72
Sulphate of ammonia and compost .....	72	71	73	69	69	71
Urea .....	75	69	67	71	68	70
Lime and sulphate of ammonia .....	69	72	66	67	70	69
Nitrate of soda .....	66	63	65	59	54	61
Bone meal .....	65	62	57	58	61	61
Check 4-C (no fertilizer) .....	48	39	43	35	37	40
Check 5-A (no fertilizer) .....	39	38	43	38	36	39
Check 6-C (no fertilizer) .....	38	38	38	38	41	39
Check 5-E (no fertilizer) .....	43	35	40	34	37	38



USGA Green Section demonstration turf garden at Pine Valley GC, Clementon, N. J. This garden is planted on sand where absence of plant food in soil accentuates differences in turf on the plots due to addition of various fertilizers.

tions. If the strength of a 12-6-4 fertilizer is reduced by the addition of an equal amount of inert material, such as sand, it gives double its weight of a 6-3-2 fertilizer. Since all the fertilizers were applied on a nitrogen basis, only half the quantity was used of the 12-6-4 as of the 6-12-4 fertilizer. Therefore this quantity would carry as much fertilizer as would have been carried in a 6-3-2 applied at the same rate as the 6-12-4. The difference in the fertilizers applied to these two plots is therefore merely a difference in proportions of phosphoric acid and potash. The 12-6-4 formula was used on the plots in preference to the diluted 6-3-2 formula merely because the modern trend of fertilizer formulas is in favor of the more concentrated mixtures to save freight charges on inert materials. The fertilizers for all gardens were weighed and packed by the Green Section staff. The materials for all the gardens therefore came from the same source and were analyzed to determine the exact amount of plant food each contained before they were packed for the gardens.

The plots were rated as outlined in the previous article in *GOLFDOM*. These ratings were consolidated for each year; then the total rating for each plot was divided by a figure representing a perfect rating for each plot on all gardens, to determine the percentage of the highest rating that would be possible with this system. These percentages are grouped in

Table I for each of the 5 years, and at the extreme right the average for the 5 years.

Referring to the table, it will be seen that, during the 5-year period, the four inorganic fertilizers gave the best results. Of these, the two complete fertilizers headed the list. The one point difference in the percentage of these two plots is insignificant when one considers that there was a difference of two points in the ratings of the check plots. In comparing these two fertilizers it should be remembered that in order to make the nitrogen equal on both plots twice as much of the 6-12-4 fertilizer was used as in the case of the 12-6-4.

The sulphate of ammonia and phosphate of ammonia plots produced the same results and rated six points lower than the best complete fertilizer. The two mixed fertilizers contained sulphate of ammonia and phosphate of ammonia, and the same amount of nitrogen was supplied to all four plots; therefore the higher ratings of the two complete fertilizers can be attributed either to the combination of sulphate of ammonia and phosphate of ammonia or to the addition of superphosphate and muriate of potash. The high rating of the sulphate of ammonia plot in this series of gardens simply adds further evidence as to the value of this fertilizer in turf culture in spite of the fact that it contains no phosphorus or potash. The high rating of the sulphate plot confirms

the evidence of past experimental work and clearly demonstrates its value for fine turf even though it has been subjected to some criticism since it was realized that it could prove harmful if used in excess.

### Poultry Manure, Sludge Equal

The activated sludge and poultry manure tankage plots gave the same results over the 5-year period. Poultry manure tankage could not be procured in 1933, so pulverized poultry manure was substituted in the last year of the experiments. Activated sludge and poultry manure are of an entirely different origin and it is interesting to note how similarly the grass responded to these two fertilizers.

The sulphate of ammonia and compost plot received a rating well below the plot which received sulphate of ammonia alone. In figuring the nitrogen for the plot receiving sulphate of ammonia and compost it was figured that half of the nitrogen would come from the sulphate of ammonia and half from the compost. The sulphate of ammonia was furnished by the Green Section but the compost was furnished by each club where the garden was located. Each sample of compost was not analyzed and therefore there was some variation in the amount of nitrogen supplied by compost in the different gardens. However the amount that was prescribed was estimated on the analysis of an average compost; therefore on the garden on which a richer compost was used the ratings were somewhat higher than on the garden where the compost was especially poor, but the average for all gardens balanced these differences. The nitrogen in the compost is not as available as in sulphate of ammonia, which no doubt accounts for the lower rating of the sulphate of ammonia and compost mixture than in the sulphate of ammonia alone.

The Urea plot placed in the center of the list.

Lime and sulphate of ammonia rated well below the sulphate of ammonia alone. In this plot enough lime was used to more than neutralize the acid residue from the sulphate of ammonia. It is well recognized that lime is distinctly beneficial when added to soil which has had too much sulphate of ammonia added by many or excessive applications. In these gardens the lime was added the first year and was added repeatedly each year thereafter; thus in the gardens there was no accumulation of acid resulting from pre-

vious applications of sulphate of ammonia. The need for lime, which is apparent on many golf courses where sulphate of ammonia has been used for a long time, was not apparent in these gardens. Rating of this plot compared with the sulphate of ammonia plot bears out the observations made at the Arlington turf garden and other experimental gardens to the effect that even though lime is beneficial in correcting certain unfavorable conditions in soil, it is not wise to use it in excess.

The nitrate of soda and bone meal plots had the same average over the 5-year period. It will be noted that these two fertilizers had ratings well below any of the other fertilized plots.

The four check plots rated much lower than the fertilized plots. It will be noted that there are only 2 points difference between the ratings of the four check plots over the 5-year period. The 2 point difference however calls attention to the variations that occur in any testing area even though every effort was made to select areas in which the conditions would be uniform throughout. The 2 point difference in the check plots also emphasizes that one should not put too great emphasis on the difference of 2 or 3 points in any of the plots. Such slight differences may be caused by a variation in the soil in the testing areas.

### Fertilizers Group Themselves

In checking over the average percentage in the above table it is interesting to note that the fertilizers are rated in a few groups. The two mixed fertilizers are only one point apart. There is a jump of five points in the next two fertilizers which are the well known ammonia salts used for golf turf maintenance. Then there is another jump of six points to a group of four fertilizers containing organic materials. These four have a difference of only two points between them. The plot receiving lime and sulphate of ammonia is rated close to this group. There is then a drop of eight points to the nitrate of soda and the bone meal plots. These two fertilizers, like the combination of lime and sulphate of ammonia which was used in the plot just above the nitrate of soda in the list, have a tendency to make the soil more and more alkaline in reaction. It is interesting to note that the bone meal and nitrate of soda plots were rated just about half way between the unfertilized plots and those which received the highest ratings in this series.

## COUNTRY'S OLDEST EQUIPMENT?



Peoria (Ill.) CC where some of the most modern course maintenance is used under the able supervision of Elmer Biggs, pro-supt., also claims to have the oldest operating golf course equipment in the country. The Peoria course is the second oldest in Illinois, having been originally built in 1897 under the direction of F. M. Birks who still is an active member of the club.

The two mules, Dink and Jack, are 37 and 35 years old respectively. They have been at work on the course since they were infant mules and still earn their keep mowing the rough on the hilly course.

Their jockey, Lije Alexander, shown at the helm in this picture, has been with the club for 28 years. He still is active as gardener on the clubhouse grounds except when the rough requires his attention and that of Dink and Jack. Principal item in the mules' maintenance is chawing tobacco, which is furnished by Lije out of his private stock.

In bygone days—before the employment of motorized fairway mowing equipment on the Peoria course, Dink and Jack hauled fairway mowers and developed such proficiency in ducking golf balls that even in their advanced years Biggs makes money betting that any sharpshooter can stand 150 yards away from either or both of these mules and drive balls at them without registering a hit. Lije maintains that neither of the mules has been hit by a ball during the 28 years he has been their pilot, although thousands of balls have whistled by so closely that the strain has begun to tell on Lije, who in his 72d year, complains that he has his moments when he feels like slowing up somewhat.

Lije was one of the astonished spectators who saw Harry Hampton, veteran Beverly professional, hole out a 65-yard approach from the brick sidewalk alongside the golf course for a deuce at the eighteenth during the Western Open. Hampton won a case of Hiram Walker whiskey for this eagle. When Lije was informed of the prize won by Hampton his comment was: "My goodness how I wish I had took up golf!"

The best test of a fertilizer is its ability to produce results over a period of years. The ratings that came from these gardens can not therefore be considered conclusive evidence as to what these fertilizers will do on the golf courses over a long period of years. In this connection it is interesting to compare the ratings of the sul-

phate of ammonia plot with one of the two plots above it. The sulphate of ammonia plot received a lower rating in the last two years than it did the first two. The two mixed complete fertilizers, on the other hand, even though they contained sulphate of ammonia, continued to give fairly uniform results over a 5-year period.

These results are quite comparable to those obtained at Arlington and other experimental turf gardens. Judging from results obtained on these latter gardens one can assume that the sulphate of ammonia ratings in these demonstration gardens would be somewhat lower if they were continued a number of years. It is also probable that a light application of lime in 1932 or in 1933 to the sulphate of ammonia plot would have resulted in decidedly better ratings of this plot. On the other hand a great excess of lime would probably have had a depressing effect, such as is noticeable in the plot which received both lime and sulphate of ammonia each year.

### Lack of Association Interest Handicaps Golf

**F**AILURE of golf clubs to join their sectional and national associations is a handicap to the growth of the game and its fullest enjoyment by its present players, says Jack Wilson of the Salina (Kan.) CC.

Wilson is of the opinion that golf club officials are negligent in the duty they owe their members by refusing to extend lively co-operation to the associations.

He sets forth his case as follows:

"In a recent issue of *Golfing* an article giving the number of golf courses by states showed Kansas in fifth place. Recently the state tournament was played and of the 283 courses in the state only 13 were members of the state association with legitimate right to have their members represented in the tournament. Does this indicate the unity and co-operation there should be in a state enjoying fifth place in the nation's golf course ranking?

"The one-day tournaments that flourished throughout the state during the depression now are going dead. It is my belief that these tournaments were run primarily on a mercenary basis and patronized eagerly by pot-hunters. Now there seems to be a condition favorable to the establishment of tournaments on a sporting, rather than commercial, platform. The pot-hunters made the circuit of the one-day events but were missing from the state tournament.

"Golfers deserve the protection of sportsmanship that they would be given by membership in a strong state association, but interest in this phase is so lack-

ing there is not one member club in the state association from among five grass green courses that one of the state's cities boasts. In the present condition of the state association its annual tournaments keep going to the same few towns and a great opportunity to develop golf interest is missed.

"It may cost the club some money to be host to a tournament. The course may require some work that costs money. Even so, the increased interest, new life in membership campaigns and greater pleasure of the members warrants the expense.

"The caddie problem at the state tournament in Kansas is something to worry about also as the traveling caddies are so bad that clubs are forced to ask for police protection while the nomadic young irresponsibles are in town. With a state association able to function widely you could look for more and better local caddies.

"The entry of the Trans-Mississippi tournament showed only 14 cities represented. Does this not indicate that some one has been asleep in not developing more good golf talent in the smaller towns?

"It is my conclusion that if the state associations were given more co-operation and memberships from clubs that should be members there would be far more golf in the United States, a more interesting competitive situation, and that the individual clubs themselves would benefit substantially.

### Riverdale Fee Course in N. J. to Have \$3,000 Open

**R**IVERDALE CC, near Westwood in the northern part of Bergen County, N. J., is to have its first Open tournament Sept. 13-15. There will be \$3,000 in pro prize money and a big prize list for amateurs. There will be 15 pro prizes ranging from \$600 for first to \$55 for fifteenth.

John Handweg, president of Riverdale, is confident that the tournament will attract considerable interest to the club and spread its fame as one of the country's fine fee courses. The establishment is 6,440 yards with 72 par. It is five years old and has an automatic high-pressure watering system. Orrin Smith was designer of the course. It is 16 miles north of the George Washington bridge and 28 miles from Newark.