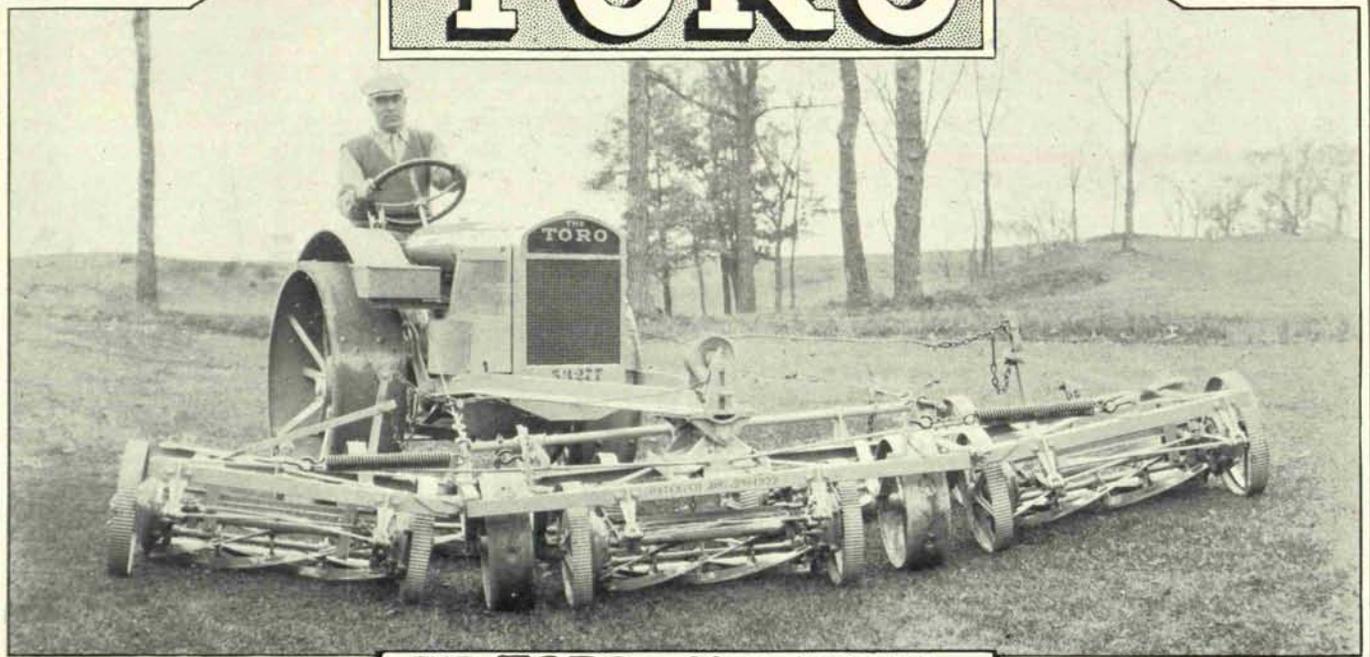


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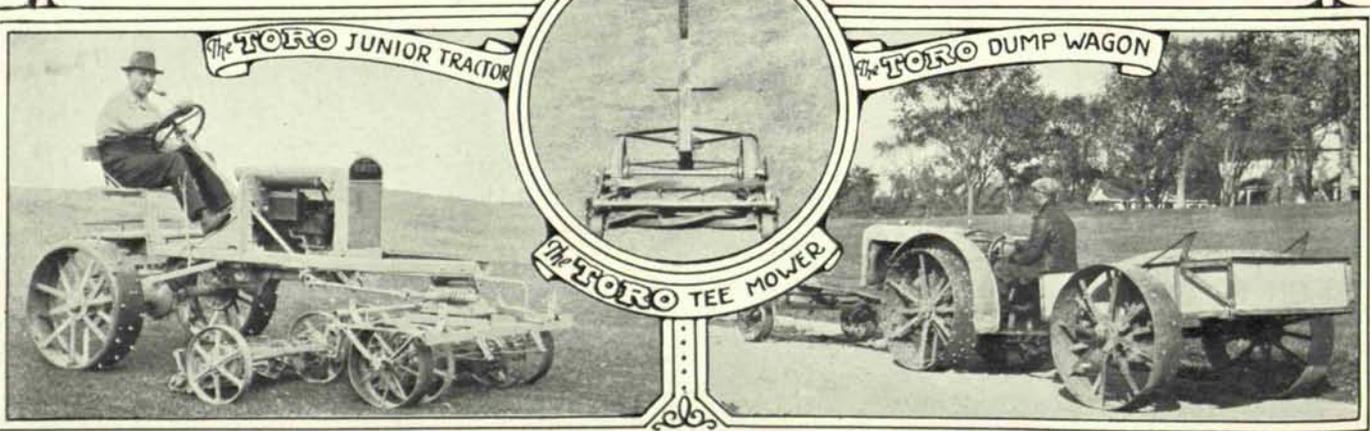
represents a distinct improvement over present makeshift types of light weight tractors. Perfectly balanced, with extreme ease of operation and all transmission parts fully enclosed, it sets a new standard in the light tractor field.

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March 26, 1927  
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Week of March 21-26

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To the Membership Committee:

I hereby make application for Charter membership in THE NATIONAL ASSOCIATION OF GREENKEEPERS OF AMERICA, and enclose herewith my dues in the amount of \$5.00, up to the Annual Meeting to be held in March, 1927, \$1 of which is for six months' subscription to the National Greenkeeper.

Date.....Signed:.....  
Greenkeeper

Home Address .....

Club.....

Club Address.....

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Date.....

Gentlemen:

Please reserve for me.....rooms at the Hotel Sherman, Chicago, for the following days.....March, 1927, at a rate of \$.....per day. I will be with you at the annual meeting.

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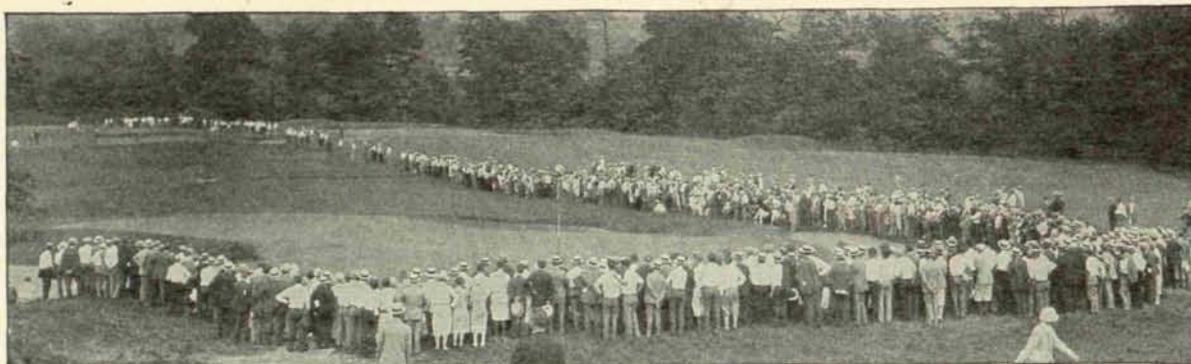


Photo by Levick

## Beautiful Turf from Tee to Green

*Sow Bent on Your Fairways!* The extreme fineness and beauty of turf produced from Bent seed are well known, and its superiority for use on the golf course is recognized. Most of the best putting greens in the country have been produced by it.

Owing to the high cost of Bent seed for a number of years, its use was restricted to small areas, such as putting greens; but now that the cost of Bent is more in line with other grasses, it is practical to *sow Bent on your fairways*. Not only will much finer turf be obtainable, but there will be an economy in possessing this grass in your fairways—you may take plugs from it when you wish to patch your greens.

Carefully distributed, 100 lbs. of Bent seed used alone will sow an acre of land. If used in a mixture with other varieties, such as Blue Grass, Red Top and Fescue, we advise that 20% of the mixture should be Bent seed.

For early spring sowing we offer

# Grass Seed

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**Remember**—All our seeds are of the highest quality, obtained direct from the most reliable sources of supply and are botanically true to name. All seeds are new and are cleaned and re-cleaned until they are brought up to the highest possible state of purity and germination, special care being given to the elimination of weed seeds.

As the time approaches for your spring work we ask the opportunity of talking or corresponding with those interested in this subject, and offer the benefit of our knowledge gained by years of experience in supplying and advising with leading Golf and Country Clubs.

### Golf Course Equipment and Supplies

A complete line of equipment and supplies always on hand for prompt shipment.

**"Golf Turf"**—The sixth edition of this interesting and instructive book will be sent upon request to Greenkeepers and Chairmen of Green Committees, or others interested in the production and maintenance of fine turf.

*Names of Greenkeepers, with references, who have registered with us are kept on file and we are always glad to furnish names of desirable applicants to Clubs in need of a competent Greenkeeper.*

# Stumpp & Walter Co

30 and 32 Barclay Street

New York City

# The NATIONAL GREENKEEPER

*Official Organ of The National Association of Greenkeepers of America*

Published monthly at 407 Caxton Building, Cleveland, Ohio.

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VOLUME I.

No. 3.

## An Editorial

### *A Message to all Members and Prospective Members of The National Association of Greenkeepers of America*

By John Morley, President

The National Association of Greenkeepers of America.

“WHAT are we going to get out of it, if we become members of the Association?” is a question I have been asked several times since the organization of The National Association of Greenkeepers of America.

It is not what we can get out of it that will make of this movement for the improvement of greenkeeping conditions and the advancement in knowledge of the greenkeepers of tomorrow something which will stand as an everlasting monument in the Golf world. *It is what we put into it.*

If we put Strife, Jealousy and Envy into it, every member will feel their lash. But if we put into it Fraternity, Concord and Love, these we shall be able to give in full measure.

Selfishness is the rock upon which many lives have been wrecked, and from which no man can look clearly and with a free conscience into the great world about him.

Greenkeepers seeking to enter this fraternity should do so without regard for material gain or worldly advantages, but to associate themselves with those who believe in the inculcation of the higher ideals of human conduct.

Let the warm sympathy that goes out into the highways and byways, that seeks out the needy fellow member and holds out a helping hand, govern the future of this brotherhood. Let the primary objects of this association be the union of worthy greenkeepers, carefully selected and strictly obligated, without reference to the accident of rank, fortune or social position.

Let us work together in harmony. Blessed is the greenkeeper whose voice is raised in the interest of Peace, whose words are kindly spoken, and whose charity is real.

Let Character be built into the foundation of this association, and may our motto always be

JUSTICE, FAITHFUL BROTHERHOOD, AND  
GENEROUS BENEVOLENCE.

Time only will tell whether I have acted wisely in bringing into existence The National Association of Greenkeepers of America. I have done my duty as God gave me power to see the light. If you desire to show your approval, attend the first annual meeting in Chicago March 26, and help create conditions which will give this association aims and objects drawn to meet the approval of all greenkeepers and the golfing fraternity in general.

# What Every Greenkeeper Should Know!

**T**HE National Greenkeeper is your own magazine, published in your interest, and for the exchange of valuable information between greenkeepers all over the country.

You can offer no greater support to The National Association of Greenkeepers of America than to contribute to this magazine detailed notes of what you are doing and how you do it on your own golf course.

Every day we receive letters from young greenkeepers, thanking us for the help The National Greenkeeper is giving them. This is the principle underlying all the work of the National Association, to help the other fellow.

No matter what you have, whether vegetatively planted or seeded greens, sand greens, good or bad greens, write and tell us your story. There is sure to be some good information in it, and if you need help, do not be afraid to ask for it. We want to get acquainted with you, whether you ask questions or give information. Tell your story in your own way, and we will use your name or not, just as you say. The National Greenkeeper breaks no confidences with its contributors, you may be sure of that.

Have you a good picture of a bird house you have constructed yourself? Have you built a good looking bridge anywhere on your course? Have you found a good method to exterminate ants, or moles, or earthworms? Did you install the water system you use, and have you drawings of this system? How are your bunkers built and drained? Do you have any natural bent on your course, and have you made use of it? Have you conducted any experiments which have proved something of value for the other fellow to know? If you have charge of the clubhouse grounds, what varieties of shrubbery and perennials do you grow, and what is a good selection of flowering annuals to plant this spring? Have you some good tips on the care of machinery and tools?

All of the foregoing questions, and hundreds of others besides, need answering. A greenkeeper in Iowa may be getting results that one in New England could get if he knew what the Iowa man was doing. We know of two golf courses located only ten miles apart, where if one of the greenkeepers had known what the other man was accomplishing, hundreds of dollars and a considerable amount of time could have been saved by both.

Will you take just a little time and write us a story for your own magazine, and send us good clear pictures of yourself and the items you write about?

The National Greenkeeper gives every greenkeeper an opportunity to express himself, to give of his knowledge for the benefit of other greenkeepers who are grateful indeed for the information they read in this magazine.

We want every word in The National Greenkeeper to represent the sound advice of practical experience, and if you, as a practical greenkeeper, wish to see each succeeding number of your magazine filled with information of practical value, sit down and write us *now*. Let us have your story, and we will use it just exactly as you direct.

Don't forget that we need good clear pictures, and plenty of them! Pictures tell a story that no man can put into words. Get better acquainted with the purposes of The National Greenkeeper, to the end that the golfers of America may recognize and appreciate the men who make possible the true enjoyment of the game of golf. If you will but do your bit, the day is not far off when no longer will it be true of the playing member of a golf club that

*You swing along oblivious to him who holds the key  
Of Fairyland for golfers, where every perfect tee  
Unfolds a scene of beauty to the city-wearied eye,  
A smoothly rolling fairway, stretching out to meet  
the sky.*

*Where the distance holds a jewel, softly shining in the  
sun,  
Cut with love and understanding by the skillful  
hand of one,  
Who with cunning and precision, and devotion in his  
heart,  
Has shaped a green of loveliness, high tribute to his  
art.*

*And every spring he turns the key, unlocks your Fairy-  
land  
And lets you in, half hoping that you'll somehow  
understand  
The pride he feels, but you walk on, unheeding and  
serene,  
For the only man who knows him is the Chairman  
of the Green.*

# Give Your Assistant a Chance

By HERBERT E. SHAVE  
Greenkeeper, Oakland Hills Country Club, Birmingham, Michigan

I CAME to the Detroit District Oct. 1, 1920. Previous to that date I had spent eight years and seven months at the Glen View Golf Club, Golf, Ill. Since coming to Oakland Hills Country Club, we have had the Western Open in 1922, and the National Open in 1924.

This article I hope may be a help to some of the younger and possibly a few older greenkeepers. It may be used more as guide for the less experienced greenkeepers. I have followed the same system for the past fifteen years and it has worked out very well.

## *Working Force*

An eighteen hole golf course, which is in fairly good condition, can be kept in first class shape with eleven men. Divide the men as follows: six men for greens and tees; two men for bunkers, mounds, etc.; one man for cutting fairways, with tractor; one man for cutting rough; one man to act as your assistant. Some greenkeepers think they don't need an assistant but I believe it is a very good thing to have someone who takes an interest in the work and whom you can trust. Get to know your men, then pick out the kind of man who you know will give you a square deal, pay him a little more and train him to your way of doing things; then in case of sickness or a vacation, you need have no worry as to how the work is being carried on; at the same time you are making a greenkeeper for some club. Good greenkeepers are scarce.

## *General Work*

Each man takes care of three greens and the tees in the vicinity of his greens. He cuts, rolls, waters, fertilizes and weeds the greens. The first duty in the spring, when you can get on the greens is topdressing with compost. One or two yards per green according to the size, mixed with thirty to fifty pounds of sulphate ammonia. Spread on and rub in with a steel mat and follow with a good rolling. I usually topdress every four or six weeks and use the same amount; but I sometimes vary with a dressing of good sharp sand; especially if the greens are composed of heavy soil. A sanding two or three times during the season will do them a world of good; because it works into the soil making it more porous, giving the grass roots a chance to spread out and go down after moisture and also letting the water penetrate deeper; besides forming a good cushion, trueing up the greens, therefore making good putting. I usually go over them every two weeks with about twenty-five to thirty pounds of sulphate of ammonia. A good way to put it on is to



Herbert E. Shave

have a water barrel sprinkler, dissolving five pounds in each barrel then going over the greens. If you haven't a water barrel sprinkler, get a Cyclone Grass Seeder and put it on with that, following with a good heavy watering.

## *Care of Putting Greens*

During the growing season we mow every day and roll three times a week. After each man has finished mowing or rolling his greens, he mows his tees, if they need it; using the same type of machine and cutting the tees nearly as closely as the greens. My men are usually through mowing, watering or rolling about noon; so they have half a day to pull weeds, fill up holes punched in greens by landing balls, or touching up poor spots if there are any.

## *Morning Watering*

Now, we come to a very important thing on a golf course. Plenty of water is very essential. I used to water at night but gave up the idea several years ago, as it is so hard to get a man who will stick to it and still do a good job. It is a very monotonous job, and it is very hard to see much of the green at one time; which resulted in many places on the greens not getting any water. Each man waters each of his greens for about three-quarters of an hour, with a one inch hose and large spray nozzle, with about thirty to fifty pounds of

pressure. When he is through his last green, his first one is dry enough to cut. When watering the greens give them a soaking so that the water will soak down about four or five inches. Do not sprinkle greens lightly in the daytime because when the sun comes out or the wind blows it will just dry up without any benefit to the greens at all. There have been a lot of comments on daytime watering, some say it is harmful; but I think it a good idea if done right. I base my conclusions on the fact that after a rain storm in the daytime, that lasts about a half hour, it works wonders with the course, so why shouldn't watering by men in the daytime be of the same value? I have thirty-six holes and all of the greens are watered in this manner. Watering takes place at the beginning of the day's work. Then we use bamboo poles and rub any moisture or dew off before cutting.

#### *Seeding*

Seeding should be done in the fall for the best results; say about September first, although lots of clubs are using vegetative creeping bent, especially in their new greens. I have eighteen greens which were planted by the vegetative method. They were planted September 1923 and were ready for play in June 1924, and they were in first class condition. But this type of green I'll leave for someone else to explain.

#### *Keep Your Bunkers Clean*

I keep two men busy working on bunkers, keeping them clean and raked, mounds and edges of pits trimmed. I made two drags by taking two pieces of wood 2 inches by 6 inches by 2 feet. These were driven full of spikes and hung together by hinges, and a piece of rope attached to each end. Two men can drag the bottom of a good many pits in a day. They also carry along a rake, to rake the sides of the pits. This is done every day on my course to 103 pits on the south course and 84 pits on the north course.

#### *Spring Fertilizing of Fairways*

Fairways are usually cut by tractor power, with five cutting units either pulled or pushed, and you should not let the grass on the fairways get too long. Any thin places on your fairways should be run over with a disc harrow. The disc should be set nearly straight so as

not to tear out too much grass; then such places should be seeded and topdressed, chain harrowed and rolled. It is a good idea to go over such places after the season has closed, with a good dressing of manure and the following year will see quite a change for the better. It is also a good idea to fertilize in the early spring. I use Activated Sludge, new name, Milorganite, at the rate of seven hundred pounds to the acre. It is the best fertilizer I have found and it is very cheap, costing \$22.50 a ton f.o.b., Milwaukee. The greenkeepers around the Detroit district who have used it are well pleased with the results it brings about.

#### *Rough Needs More Attention*

The rough we cut with a tractor and three cutting units and it is kept down pretty close, so as to speed up the play. When the rough is long, balls get lost easily and lost balls mean slow play, and slow play on a much played course is unsatisfactory, so keep your rough down.

#### *Choose a Good Assistant*

The assistant greenkeeper should know enough to go around and change the holes; of course he must be shown how, but after being shown how he should be made to do it, as it gives him practice and at the same time he can see that the men are doing the right thing; also he will be able to see places on the course that need attention. He should be given every kind of work to do and when he becomes adept at his work it will help you and may also be the means of getting himself a place of his own.

#### *No Two Courses Alike*

Do not think that all courses are the same; because they are not. There is a difference in courses, even though they may only be a few miles apart. One course may be very sandy, another a little heavier, another might be heavy soil, another clay. Each one needs different treatment and if you don't know how, ask some of your fellow greenkeepers; they will be glad to help you. Remember that we are never so wise that we know it all; that every day there are hints which might be of great help to us, so pay attention when you are talking with another greenkeeper and he may tell you something you never dreamed of before.

## **ONWARD!**

**Forever more the greenkeepers  
Of the good old U. S. A.  
Will march with those of Canada  
Along Life's broad fairway.**

**In serried ranks, with steady gaze  
Fixed on the goal ahead,  
Behind them lies Uncertainty,  
Before them Truth instead.**

**The standard bearer holds aloft  
Two flags that blend as one,  
For Uncle Sam and Canada  
Have this great work begun.**

**And Character shall pave the way,  
And Helpfulness shall be  
A light to guide the footsteps  
Of this great Fraternity.**

# The A B C of Turf Culture

## Conducting Experiments With Milorganite

By O. J. NOER

### Experiments on New Greens

UNDER favorable conditions rapid development of dense turf on new greens depends upon the supply of plant food. Nitrogen, more than any other element, promotes the vigorous vegetative growth which results in quick formation of heavy uniform turf. Yet too much nitrogen may produce a coarse textured turf.

In a number of trials Milorganite proved to be an excellent source of nitrogen for new greens. Wherever possible all other fertilizers, including manure, were omitted. Soil of suitable physical condition was obtained by the use of sand or soil. Milorganite, at the rate of 50 to 60 pounds per 1,000 square feet of greens was spread uniformly over the surface and worked into the soil prior to planting the stolons. Manure and fertilizers were omitted from the soil and sand mixture used to cover the stolons, but some Milorganite was used in subsequent top-dressing. These consisted of a mixture of sand, soil and Milorganite.

Excellent turf was quickly produced by this treatment, and the benefits from the Milorganite extended into the following season. In one trial, a green received the above treatment, and on an adjacent green manure was worked into the surface soil and subsequent top-dressings contained manure compost. The turf closed in on the Milorganite treated green first, and early the next spring the superior color of this green was easily visible at a distance of 80 rods.

The practice of imbedding manure in new greens serves no useful purpose. The plant food is placed beyond reach of the turf roots, and the large quantity of organic matter encourages worms. Uneven settling which often occurs may leave poor putting surfaces. The value of manure in the surface layer of soil is often over-emphasized. Soil of proper physical condition may be obtained by the sole use of sand or clay, although there are some instances where manure should be used. The manure may introduce weed and clover seeds, and encourage clover by virtue of the lime and potash it contains.



O. J. Noer

Editor's Note: Mr. Noer is now at the head of the Educational Bureau of the Milwaukee Sewerage Commission. During the past four years he has investigated the fertilizer value of Milorganite at the Soils Department, University of Wisconsin, under a fellowship established by the City of Milwaukee.

### Experiments on Turf Nurseries

Very striking results were obtained with Milorganite on a number of turf nurseries where the stolons were planted broadcast. The Milorganite was spread over the surface and worked into the soil on a portion of the nursery prior to planting the stolons. These treated areas were the first to close in and were completely covered with turf long before the untreated areas.

### Experiments on Established Fairways

Established fairways often require fertilization and are best improved by the use of nitrogen. Phosphate and potash encourage the growth of clover and should be used sparingly if clover is not desired. It is best to apply the fertilizer early in the spring. During the mid-summer dry weather often obtains and most fairway turf becomes dormant. It is difficult to improve turf by the use of fertilizers at this time.

Milorganite was compared with sulphate of ammonia as a source of nitrogen on an old established blue grass sod. These materials were applied early in the spring at the following rates: Milorganite 1,000 pounds per acre and sulphate of ammonia 200 and 400 pounds. Results from the sulphate were visible after the first rain. Growth was so rapid that frequent mowing was necessary, but as the season advanced it was evident that growth was not being sustained. The 400 pound rate of application maintained growth very well but the turf required very frequent mowing. While Milorganite did not produce such quick results, it soon imparted a good color to the turf and sustained uniform growth throughout the season. The turf did not require such frequent mowing.

Where quick response is desired a combination of Milorganite and sulphate of ammonia gives excellent results. The small amount of sulphate produces initial growth and the Milorganite then sustains the turf through the balance of the season. A mixture of 50 pounds sulphate of ammonia and about 750 pounds Milorganite have been effective.

### Experiments on New Fairway Seedings

Good turf once established is easily maintained, but thin patchy turf is difficult to improve by subsequent reseeding or fertilization. The small grass seed contains very little stored plant food. Unless the tender young grass seedling obtains an abundance of plant food, development is checked and many seedlings often fail to survive because of unfavorable conditions for further growth. Fertilizers encourage early development of an extensive root system, promote vegetative growth and thus aid in the rapid establishment of heavy dense turf. With August seeding it is possible to obtain uniform heavy turf able to withstand adverse winter weather, and early the following Spring it is in surprisingly good playable condition. The cost of fertilizer, compared with the cost of seed and soil preparation is so small, and the difficulty of improving poor turf is so great that fertilizers should be more generally used. Fertilizers should be used even on the better soils. They hasten growth and consequently aid in quickly establishing good turf.

Prior to seeding, fertilizers can be worked into the surface layer of soil to a depth of several inches. This places the plant food in the soil zone where root development occurs, and since surface applications of some fertilizers do not readily penetrate into the soil, better results are obtained when the fertilizer is applied before seeding. Benefits from such applications extend over several seasons.

In a number of trials very striking results were obtained from the use of Milorganite and acid phosphate. No benefits were obtained from the use of potash in addition, although its use in limited quantities may prove beneficial on sands and mucks. The phosphate stimulated root development and insured a uniform stand of turf. The nitrogen of Milorganite then promoted rapid vegetative growth and an excellent turf resulted. Benefits extended into the succeeding season.



Fairway seeded in August, photographed following May. Center strip received 1200 pounds Milorganite and 250 pounds acid phosphate per acre. Note poor stand on unfertilized area in background and foreground

Milorganite was applied at the rate of 1,000 to 1,200 pounds per acre and acid phosphate at 250 to 300 pounds per acre. Uniform distribution was obtained by the use of a hopper type lime and fertilizer distributor. The contents of a bag of Milorganite was spread over the bottom of the hopper and the proportionate amount of acid phosphate was sprinkled over it. The two were then mixed by hand or with a shovel. Successive additions were made until the hopper was filled. Fertilizers were applied just prior to seeding and worked into the soil with a disc or Scotch chain barrow.

Results from the use of fertilizers were obtained in every case of Fall seeding. Turf was slow in establishing itself on the unfertilized areas, and was often patchy. Where the fertilizer was used dense heavy turf was obtained by October with August seedings. During severe winters the unfertilized turf was badly winter-killed, and where Milorganite and acid phosphate were used the turf came through the winter in excellent condition. The uniformly successful results indicate that fertilizers should be more generally used on new fairway seedings.

Milwaukee's new sewerage disposal plant is now in operation and will produce approximately 35,000 tons of dry fertilizer per annum. The plant is unique in that it represents the first successful attempt at large scale production of fertilizer from sewage. This is made possible by the use of the new "Activated Sludge" process which is the only one capable of converting the plant food elements contained in sewage into a high grade fertilizer.

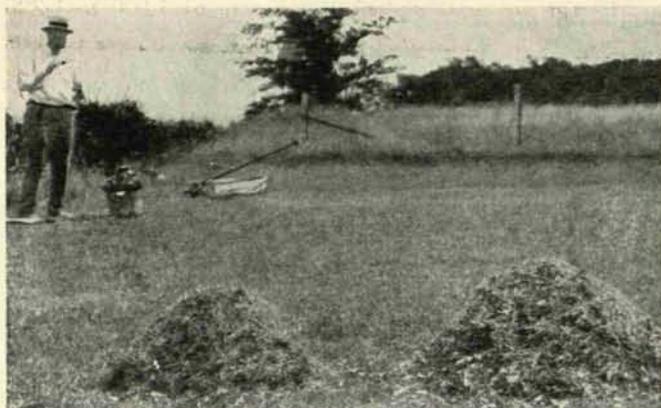
The necessity of obtaining reliable information regarding the fertilizer value of this new material was early realized, and accordingly a fellowship was established by the Commission at the University of Wisconsin. Investigations, conducted during the past four years have been concluded, and it now seems advisable to present briefly some of the most important results pertaining to the use of Milorganite on golf courses.

#### Nature and Composition of Milorganite

Milorganite is a dark brown granular material of uniform composition, absolutely free of weed seeds and harmful bacteria of all kinds. It has the following average composition:

Nitrogen (equivalent to ammonia)	6½%
Phosphoric Acid	2½%

While most of the nitrogen is not in a form which plants can use directly, soil processes convert the nitrogen into available forms gradually. Thus loss from leaching is avoided, and a uniform and continuous supply of nitrogen is assured. Milorganite is an absolutely safe material to use because it does not burn or injure the growing plant.



Two piles of grass clippings from equal areas of old established fairway. Pile on left cut from unfertilized area. Pile on right cut from area fertilized with Milorganite at rate of 1000 pounds per acre



A green planted with stolons early in August and photographed October 5. Note the thick and uniform stand of grass resulting from an application of 250 pounds of Milorganite which was worked into surface soil prior to planting

### Experiments on Established Greens

Nitrogen is generally the most critical element in turf culture, since it is responsible for active vegetative growth and dark green color. Established greens are in especial need of a uniform and continuous supply because they suffer constant losses. The amount of nitrogen removed in clippings during a season is considerable, and heavy watering results in further losses of soluble nitrogen due to leaching. Milorganite should be an ideal source of nitrogen for greens because its nitrogen is gradually converted into available forms as needed by the turf. This provides for a long feeding, and minimizes the danger of loss from leaching.

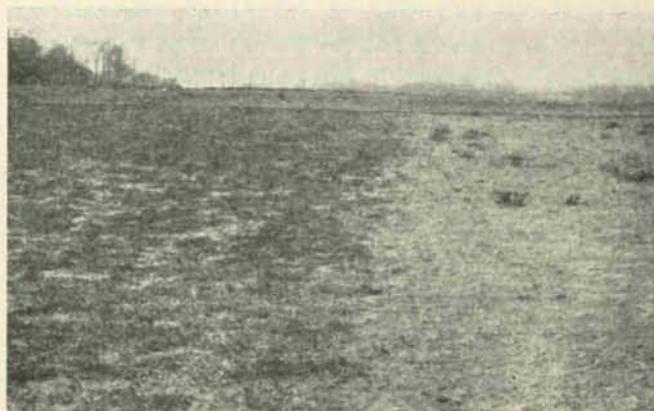
In preliminary experiments broadcast applications of Milorganite did not produce the desired results. Apparently the dense mat of turf particularly on creeping bent greens prevented the Milorganite from penetrating into the soil where its nitrogen is converted into available forms. To overcome this Milorganite was mixed with sand and soil top-dressing mixture, and after standing ten to fourteen days the mixture was applied to the green as a top-dressing. Excellent results were obtained because this method insured inoculation with the soil organism which convert the nitrogen into soluble forms. Later equally good results were obtained by scattering Milorganite uniformly over the surface of the green and then a top-dressing of sand and soil mixture was applied over it.

Applications of 35 pounds per 1,000 square feet of green produced excellent results, and maintained satisfactory growth over periods of at least six to seven weeks. It was found that three times this amount (100 pounds per 1,000 square feet) did not injure or burn the turf.

Whenever possible manure was omitted from the top-dressing mixture. Suitable mixtures were obtained by varying the proportion of sand or soil. Such mixtures containing Milorganite as the sole source of nitrogen

proved fully as effective as where manure was used. Where local soil conditions permit, mixtures consisting of Milorganite, sand, and soil can be made and used immediately. Milorganite does not require long composting, because it is free of weed seeds and already possesses good mechanical condition. Manure requires long composting to kill weed seeds and to obtain a mechanical condition which permits screening. This requires more work and necessitates anticipating top-dressing requirements. Manure also contains considerable lime and potash. Both may encourage clover.

Milorganite sustained growth over a longer period than sulphate of ammonia, but was a little slower in producing initial results. It has little effect on the soil reaction. Where an acid soil is desired both materials can be used to advantage. The sulphate regulates the soil reaction and induces initial growth which is then sustained over a long period by the Milorganite. These two materials can be mixed and then incorporated with the sand and soil top-dressing. This method insures uniform distribution of the fertilizers in the top-dressing mixture and reduces the danger of injury from the sulphate of ammonia.



Turf nursery planted in September and photographed following May. Area fertilized at rate of 2000 pounds Milorganite per acre is clearly shown at left of picture. Unfertilized area at right required replanting

# Well Built Bunkers Reduce Upkeep

By PETER McEWAN STEWART  
Greenkeeper, Lakeshore Country Club, Glencoe, Illinois

THE care of bunkers and traps will depend very largely on their construction. Those that are properly built are much easier to maintain than the ones that are badly made. For this reason it is wise in most cases, to first correct the actual faults in the form, or construction, of the bunkers. One of the first things to correct is the drainage, for a trap, or a bunker, that does not drain properly is hard to maintain and a constant source of trouble.

Bunkers and traps should be so well drained that the water disappears almost at once after it stops raining. This being so, it is necessary to use tile that is quite a bit larger than the space to be drained would seem to require.

If the slope of the side of the bunker is not proper, or is contrary to the laws of Nature, it had best be changed, for Nature will insist on its rights, and will cause a lot of trouble until its laws are complied with.

## *The Cop and the Face*

Another thing that should be watched very carefully, is the cop of the bunker. This should be so that it can be cut with a machine. One of the things that makes the proper maintenance of bunkers and traps cost so much is the amount of hand labor required. A long easy slope on the cop not only looks a whole lot better than an abrupt one, but makes the cost of keeping the grass cut, very much less.

Maintaining the face of a bunker is very important and depends, as stated above, largely on the slope. The slope should be about the way a rope hangs.

It is undesirable to try to get the sand to lie far up on the face of a bunker in any position where the surface water can come from outside, run down over the face and wash the sand away. Neither is there much object in sanding a bunker face so far up when it cannot be seen from a distance. In cases where the player can see

the bunker only when it is faced high with sand, then sod should be revetted above it in order to compel a player to attempt a proper bunker shot. This is done by placing one sod on top of another to a height of 8 to 12 inches, and about 12 to 15 inches deep as indicated in the accompanying sketch.

## *How to Lay Revetting*

Revetting should never overhang a bunker, but should be about vertical, and should never extend to the bottom of the face or near the bottom, as a ball might lie up against it in a position from which it could not be played toward the hole. For the same reason, that part of the face immediately over the revetting should at once slope downward, never flat or nearly flat.

In laying turf on the revetted portion it is desirable to lay the lowest layer on a solid platform of clay, so that it will not have the same tendency to sink that it would if laid on loose soil. In building up the revetting, the top layer should be laid at right angles to the bunker, instead of parallel with it, in such a way that one end of each sod will take root in the revetting and the other end in the ground behind it. By placing the sod in this way, one can get on top of the revetting without so much fear of breaking it down.

If, because of the nature of the soil, it is impossible to maintain the face in satisfactory shape with sand, then it will have to be turfed. If possible it is best to turf these faces with Bent or Fesque, as they don't have to be cut as often as other grasses, and because of their ability to spread, are able to withstand the wash that such slopes get in case of heavy rain storms. These grass faces should be kept cut reasonably close so that a ball will be sure to roll back into the sand.

## *General Bunker Maintenance*

The bottom of the bunker should be kept covered with at least 4 inches and better 6 inches of sand. This sand should be as sharp as possible. Lake or Sea sand is very much better than bank or river sand. Lake sand does not cake like bank sand, and because it is free from clay will last very much longer before it has to be replaced.

