

BULLETIN NO. 2



A SENSIBLE FERTILIZER PROGRAM

for

GREENS, TREES, AND TURF NURSERIES

O. J. Noer  
Agronomist

TURF SERVICE BUREAU  
Milwaukee Sewerage Commission  
Milwaukee, Wisconsin







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Sooner or later clubs everywhere must find a satisfactory substitute for the manure compost formerly used in topdressing mixtures. Water soluble fertilizer, even with humus substitutes in the topdressing, can never replace the plant food supplied by manure compost. With soluble nitrogen only there is a quick, rapid burst of growth at the start, so grass grows too fast at first, but starts downhill immediately thereafter. Only water-insoluble organic nitrogen can reproduce the slow-acting, long lasting effects formerly obtained from the water-insoluble organic nitrogen of manure compost. Milorganite is the ideal substitute because its nitrogen is all-organic water-insoluble, yet becomes available as needed. Unlike other organics, Milorganite is rich in iron and the rare elements formerly furnished by manure. With Milorganite to furnish organic nitrogen and these essential rare elements it is only necessary to add enough organic matter to the soil-sand mixture to improve its mechanical condition, plus the amount of potash formerly provided by manure compost.

In practice, suitable topdressing can be made by varying the proportion of soil and sand to produce a medium sandy loam and adding up to 30 per cent by volume (but no more) of organic matter in the form of good quality peat humus, etc. Then use Milorganite to supply insoluble organic nitrogen, provide the potash formerly furnished by manure, and supplement with phosphate if needed in accordance with program suggested below. The procedure is simple and economical.

When peat is used to furnish organic matter, enough nitrogen is needed to feed both grass and increased numbers of micro-organisms. In that event the suggested rate for Milorganite should be increased 35 to 50 percent.

Sometimes greens need topdressing, but have ample nitrogen. Then the soil-sand-humus mixture is preferable to the old manure compost dressing. It does not stimulate additional growth, and Milorganite can be used later to furnish nitrogen when needed.

Weed seeds are often introduced with topdressing. Instead of resorting to expensive steam sterilization, viable weed seeds (excepting goose grass) can be killed by adding 75 to 100 pounds Milorganite per yard of mixture during mixing to generate heat needed to kill viable seeds. This small amount will never force excessive



growth of grass. It is important to rework pile after 7 to 10 days, or when interior becomes quite warm. This stops further heating and prevents "fire fang". Obviously, the amount of Milorganite applied in the top-dressing should be deducted from the quantity normally used on greens.

On fairways potash is almost never needed, and phosphate is secondary to nitrogen. But on greens the situation is different. Both are removed in clippings and the drain is accentuated by more generous nitrogen feeding and a heavier watering schedule. However, even when required, applications of phosphate or potash need not exceed two a year, one in early spring and the other in early fall. These are the logical times to use most of the organic nitrogen also. The three can be mixed and applied together.

Although nitrogen in excess encourages all types of disease, the opposite extreme - - nitrogen deficiency or starvation - - is bad also, because it favors "dollar spot". In late spring or early summer, attacks of dollar spot may be produced or accentuated by nitrogen deficiency. This is very apt to occur when all the nitrogen applied in early spring was water-soluble. Rains and irrigation leach out any soluble nitrogen not taken up by the grass, and then the stage is set for a severe attack. Turf growth slackens or stops and color fades just before dollar spot hits. Milorganite, when used in early spring, and again in late May or early June, lessens the danger. First, because leaching loss is negligible, and second, because soil processes furnish nitrogen as needed. Thus turf is always healthy so it can resist attack. This is an established fact based upon experience at many clubs - - and not theory only.

As a rule, difficulties on greens arise in midsummer. They result from over-watering, and are aggravated by too generous use of nitrogen fertilizer. Whenever grass leaves are soft and bruise easily, turf may collapse during hot humid spells. The obvious remedy is to revise water practices to produce sturdy turf, and change rate, kind, or frequency of nitrogen fertilizer, if necessary. Water soluble fertilizers are more apt to produce weak grass than slow acting Milorganite.

Turf on greens is a highly specialized crop and hence demands specialized care. Instead of succumbing to the miraculous claims made for "John Doe Special Greens Turf Mixture", the wise greenkeeper devises a program to fit local conditions. If available, he naturally selects an analysis which supplies the plant food elements actually needed; provided the formula contains ample organic nitrogen. Otherwise he bases the fertilizer program on the use of straight fertilizer materials. This is sensible practice, because then applications can be varied to fit local needs for the various essential nutrient elements. To make such mixtures for greens is not a tedious or difficult task. For 18 greens not more than a ton or two at the most is needed each spring and fall. Hence mixing occurs only twice a year. It is no more difficult than mixing fungicide for disease control.



## FERTILIZER PROGRAMS

### Established Bent Greens

The program outlined below is designed for bent grass greens and is applicable where available soil phosphorus and potash are normal. Hence it covers the great majority of bent greens throughout the United States and Canada.

LIME: Need for lime should be based upon soil reaction. In regions where lime is needed, make one application each year, preferably in late fall or early spring. Use a finely ground limestone, but apply dolomite containing not less than 15 to 20 percent magnesium, reported as magnesium oxide, whenever available magnesium is low (500 pounds per acre, or less by the Hellige-Truog Method).

The following is offered as a guide for estimating quantity needed, based upon soil reaction as pH. Indicated rates are pounds of finely ground limestone per 1000 square feet of green.

4.0 to 4.5 pH - - - 60 to 80 pounds

4.6 to 5.0 pH - - - 40 to 60 pounds

5.1 to 5.5 pH - - - 20 to 40 pounds

5.6 to 6.0 pH - - - 10 to 20 pounds

6.1 to 6.5 pH - - - 0 to 10 pounds

SPRING AND FALL FERTILIZATION: Milorganite should be used in spring and fall to provide essential long lasting organic nitrogen. Two applications are required in spring, but one in fall suffices, if it supplies enough nitrogen.

The need for organic nitrogen in fall is often overlooked. Of course, bent grass should harden-off just before winter to minimize snow mold and other types of winter damage. However, grass should grow aggressively right up to that time. Otherwise poa annua, pearlwort, chickweed, etc., take possession because they flourish in cool weather when bent grass on a low nitrogen ration becomes dormant. To prevent poa annua from gaining complete possession, enough nitrogen must be used so bent remains aggressive all fall.

When needed, one application in early spring and one in fall provide ample phosphate or potash for the entire season's growth. Since these are also the best times to use Milorganite, they can be mixed and applied together.

The following program has been highly successful on many courses.

In early spring, just before active growth starts, the following materials are used. They can be mixed and applied together. Indicated rates are pounds per 1000 square feet.

|                             |                 |
|-----------------------------|-----------------|
| Milorganite                 | 15 to 25 pounds |
| 20% Grade Superphosphate    | 5 to 10 "       |
| 50% Grade Muriate of Potash | 3 to 7 "        |

Toward the end of May, or during the fore part of June Milorganite is used again, but at reduced rate of 10 to 20 pounds per 1000 square feet.

In late August or early September, after hot weather is over, spring fertilizer is repeated at following rates:

|                             |                 |
|-----------------------------|-----------------|
| Milorganite                 | 20 to 35 pounds |
| 20% Grade Superphosphate    | 8 to 15 "       |
| 50% Grade Muriate of Potash | 3 to 7 "        |

Aim to approach the higher rate for Milorganite when top-dressing mixture is devoid of manure compost or mushroom soil. Follow the same rule for potash unless test shows soil to be high in available potash.

New root formation starts in fall. Consequently, phosphate should be used more liberally than in spring. Use maximum quantity where available soil phosphorus is low, otherwise approach lower rate.

In testing for phosphorus and potash be sure to use a method which gives trustworthy results. Many methods show need for phosphate and potash which are not supported by field practice.

When applying superphosphate or potash fertilizer of any kind (ammonium sulphate and other soluble fertilizer also) be sure grass is dry, and water-in at once if turf is growing. Otherwise burning may occur.

A little soluble nitrogen can be used with Milorganite to start growth in spring. The rate for ammonium sulphate need not exceed 1 to 3 pounds.

NOTE: An 0-10-10 or other mixed fertilizer of similar analysis can be substituted for 20% grade superphosphate and 50% grade muriate of potash. At 20 pounds per 1000 square feet 0-10-10 is equivalent to 10 pounds 20% superphosphate and 4 pounds 50% muriate of potash.



SUMMER FERTILIZATION: Since ample phosphate and potash were used in spring, additional nitrogen is the sole necessity during summer. In regions where hot weather prevails from June to September, use nitrogen sparingly during that period. Rate and frequency should be adjusted to barely maintain color and growth. The rate for soluble fertilizers, such as ammonium sulphate should not exceed 1 to 3 pounds per 1000 square feet at any one time. Ordinarily from 3 to 4 weeks should elapse between applications.

GRUB AND EARTHWORM CONTROL: In Eastern sections grubs of the Japanese and Asiatic beetle are apt to play havoc with turf on greens. In other sections grubs of the May or June beetle sometimes cause similar damage. Although earthworms do not damage grass, they throw casts which interfere with play and hence are objectionable.

All these pests can be controlled with lead arsenate. An initial application of 5 to 10 pounds per 1000 square feet is needed, but after that one application a year at 3 to 5 pounds per 1000 will maintain lethal concentrations.

Lead arsenate is too fine grained to apply alone, so a carrier must be used. Milorganite is the best carrier, because the minute particles of arsenate cling to its sponge-like granules. From 3 to 5 pounds Milorganite are needed to carry each pound of lead arsenate. It is easy to mix and apply the two materials. Any good fertilizer spreader will do, otherwise apply by hand. In that event, apply one-half the mixture while walking in one direction and the balance while walking in a direction at right angles to the first.

FERTILIZATION BEFORE LAYING SOD: Ample phosphate is needed underneath sod to stimulate new root growth, and thus speed knitting of sod to soil. Nitrogen is required on top to promote vegetative growth.

First apply 20% grade superphosphate at 15 to 25 pounds per 1000 square feet and work into surface of prepared soil to a depth of 1 to 2 inches. Then lay sod and apply Milorganite at 20 to 50 pounds per 1000 square feet. Use lighter rate where soil fertility is reasonably high, otherwise approach the maximum quantity.

Bent sod for use on greens should be cut thin, not more than 1 inch thick. The bottom surface of such sod presents the maximum number of roots and hence knits quickly.

### New Greens

LIME: If soil is distinctly acid, lime is needed. It should be applied well in advance of seeding and worked into surface soil. The quantities recommended for established greens apply to new seedings also.



FERTILIZATION BEFORE SEEDING OR STOLONIZING: The generous use of phosphate is most important. It is needed to stimulate initial root formation and thereby speed turf development. The fact that phosphate can be mixed with soil to depth of several inches is added justification for its generous use. Then additional phosphate in quantity is unnecessary for several years at least.

Nitrogen is needed also to encourage vegetative growth. Milorganite does not injure young seedlings, even when used just before seeding. Hence it is superior to soluble fertilizer on new seedings. When used, the latter must be applied at least a week to ten days before seeding to prevent possible burning.

Best practice is to use 15 to 25 pounds of 20% grade super-phosphate and 20 to 50 pounds Milorganite per 1000 square feet. If available soil phosphorus is high, use lower rate for phosphate, but apply maximum quantity when available phosphorus is medium to low. On seeded greens use the lower rate of Milorganite, unless fertility is low. Then the larger quantity is needed. On vegetative plantings of stolons, use the heavy rate for Milorganite always.

When planting by stolon method, use not to exceed 1/4 yard of topdressing per 1000 square feet to cover stolons and keep area moist at all times by frequent sprinkling until stolons are well rooted. It is better to use coarsely shredded, rather than cut stolons. Then use Milorganite liberally to hasten growth and speed coverage. Shredded stolons form turf quicker than cut ones.

When sod from nursery is used on new greens, follow procedure recommended above under caption "Fertilization Before Laying Sod".

### TEES

To maintain good turf on tees is a real task, because grass receives shameful abuse throughout the playing season.

The first necessity is to make tees sizeable, so markers can be moved often, and not returned to a particular spot until after grass recovers. Selection of grass variety is important too. Kentucky blue grass and bent are usually best, but poa annua does well in cool regions. Fescue, although the golfers' favorite, is too feeble in its creeping habits and hence cannot cope with heavy play. A mixture of Kentucky blue grass with a little Colonial bent is customarily used. But in regions where crab-grass is a constant threat, vegetative planting of Washington strain, or other tight, turf-forming creeping bent is more satisfactory. Creeping bent tees must be cut close at all times. A putting green mower should be used.

Tees are often surrounded by trees. In such locations tree roots invade the tee and deprive grass of needed moisture. Good turf cannot be expected unless trees are removed, or roots severed by trenching between tree and tee.



FERTILIZATION - ESTABLISHED TEES: Since tees take a terrific beating, generous fertilization is necessary to speed grass recovery.

If soil is distinctly acid, lime should be used, particularly if blue grass is desired. The rate should be 20 to 60 pounds per 1000 square feet, depending upon degree of acidity.

Where Kentucky blue grass predominates, use Milorganite at 40 to 50 pounds per 1000 square feet in early spring. Milorganite again in May or June, but reduce rate to 20 to 30 pounds. In late August or early September use the full rate again. For tees in shade reduce rate 25 to 50 per cent.

On vegetative bent tees, use 30 to 40 pounds per 1000 square feet in early spring. In May apply 15 to 20 pounds, and in early fall repeat early spring dosage.

The use of phosphate or potash should be based on soil content of available phosphorus and potash. If required, one application in spring will suffice. The rate for 20% grade superphosphate need not exceed 10 to 15 pounds per 1000 square feet, and not more than 4 to 6 pounds of 50% grade muriate of potash is ever required.

NEW TEES: Soil reaction should be checked to determine possible need for lime. If required, it should be used before applying fertilizer or sowing seed. Use rates suggested for established tees and work into surface soil to a depth of 1 to 2 inches.

Before seeding, use 15 to 25 pounds of 20% superphosphate and 20 to 50 pounds Milorganite per 1000 square feet. Use the lower rate on seeded tees where soil is reasonably fertile, otherwise approach the higher one. On vegetative plantings with stolons, apply Milorganite at the maximum recommended rate.

### TURF NURSERIES

A good nursery of bent grass for greens repair and one of Kentucky blue grass and Colonial bent for use on tees is an asset at any club.

On bent nurseries for greens, surface soil, at least to a depth at which sod is cut, should be medium sandy loam. By volume it should contain about 20% organic matter. Hence before starting a nursery, native soil should be modified mechanically, if need be. Sand or soil, and organic matter should be added. Unless this is done, it is not safe to use sod from areas of heavy soil until a one inch layer of sandy loam is built by topdressing.

First plow and harrow the entire area, or better yet, use a Roto or Ariens tiller. Then spread sand and humus over the surface and mix with the soil by discing or with the Roto tiller. Sharp turns should never be made with a disc, because sand is thrown into pockets and never becomes incorporated with the soil.



Elaborate soil preparation is seldom necessary on sod nursery for tees. A loam soil is needed so golfers are assured of a firm footing.

FERTILIZATION - BENT NURSERY: Follow recommendations for new greens. After all turf is to be used for the same purpose.

FERTILIZATION - BLUE GRASS - TEE NURSERY: If soil is acid, apply needed lime first, at rate suggested above for tees. Then use 20% grade superphosphate at 20 to 25 pounds and Milorganite at 40 to 50 pounds per 1000 square feet and seed.

LATER FERTILIZATION: After nursery is established turf not used for sodding should be fertilized spring and fall.

On bent grass nursery follow recommendations for established greens.

Fertilize Kentucky blue grass nursery in spring with Milorganite only at 35 to 40 pounds per 1000 square feet. In fall use Milorganite again at same rate along with 20% grade superphosphate at 10 pounds per 1000 square feet.







