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The Editor's Chair

 $T_{\rm IME}$ was when turf was just plain grass. Back in the gay 90's many well-kept lawns were a hodge podge of everything which came from the sweepings of the hay barn.

How different things are in this age of extreme concentration. The automobile costs so little and operates so economically. Figuring miles per dollar it is astounding what the inventive genius' have accomplished. In medicine the human body is no longer a secret. They take out your vital organs, scrub them up, and put them back again.

 $O_{\rm UR}$ progress, stepped up as it has been through the last two decades, is due to intensive education and smoothworking methods and organization. Seed from the hay barn is out. Big bored motors are out. People do not die now unless they live to excess or have too many doctors.

T HE job we have is primarily fine grasses—how to grow them and how to keep them. We publish the best information obtainable on soil structure, seeds, fertilizers and maintenance equipment.

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T URF culture is no more a secret now than automobiles or surgery. It is no longer necessary to guess what seed to sow, what fertilizer to use, or what equipment for maintenance should be employed. Many of our largest universities such as Amherst, Rutgers, Penn State, Iowa State and the University of Wisconsin have winter schools for groundskeepers who have charge of golf courses, parks, cemeteries, private estates and school and college grounds. Experimental turf plots have been installed where soil conditions and fertilizers are carefully checked in connection with seed mixtures used. The result of these investigations are reflected in the columns of the NATIONAL GREENKEEPER and TURF CULTURE.

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 \mathcal{E} VERY week and every month and every year something new is developed for better turf. We suggest to our readers that you write to those listed in our Buyer's Guide whose products fit into your requirements. It is up-todate and all of them are perfectly reputable and dependable. This is just a thought of keeping posted and knowing what is best to do when the time comes.

T HESE are trying times and the middleman must have his day. You will find in the Market Place section a list of dealers who serve the turf culture field in a personal capacity.

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 T_{HESE} men are merchants who not only sell the best products of the trade but provide quick service to those in their district who need it. We do not hesitate recommending them to our readers because they are, so to speak, the "shock troops" who carry the brunt of the manufacturers' sales campaign.

CMPLOYMENT is a national program and we want to do our bit. If any of our readers want a job or want someone to do a job, send in your request with 50 cents in stamps and we will broadcast it over the world.

Grub Worms and What to Do



The grub worm menace affects all growers of fine turf. The cut on top shows the injury to turf by the English Starlings with an inset indicating an example of injury nearly natural size. The lower cut illustrates the application of arsenate of lead with a rotating fan duster. This work must be done when there is little wind blowing.

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The NATIONAL GREENKEEPER and TURF CULTURE

The only trade journal in the world devoted to the growing of fine turf grasses.

Soil Structure and Fertilization

By JAMES A. SMITH

J ULY and August are two months in the year that all turf growers would like to have eliminated, and this year most of us would have included June. These months are supposed to be rest periods for practically all plant life. Blue grass in the field has produced its seed, is yellow and will now rest until fall rains bring it on again.

Not so with good turf. It must remain perpetually young. We upset its natural habits by special feedings and handling and make the grass like it. Like the human body, we may force it to extra hours by stimulation but stimulation is a dangerous thing and collapse may follow. Neglect it for a moment and it will start on its vacation. Once started, it is hard to stop. The work you

have done in the early part of the season should have prepared it for the extra hours of production you will insist upon.

If you have been compelled to work with a poorly-prepared seed bed you will have rootage so shallow that your moisture supply will be insufficient. If, from your turf during the growing season, you have removed all clippings, you will have lost the mulch which would help conserve moisture.

If you have clipped your turf too close, you have not allowed sufficient leaf surface for the evaporation necessary to bring up new feedings from the rootage. If your feeding scheme has been unbal-



The author is nationally recognized as a keen analyist of soil structures and their reaction to the effect of fertilizers on plant growth and bacterial activity.

anced, with too rapid foliage growth, succulent leaves cannot stand the heated weather. Any of these errors can be easily made and the results may be disastrous.

LOOK FIRST TO THE CONDITION OF YOUR SOIL

IF YOUR turf is unsatisfactory, look first to the physical condition of your soil. If it has a tendency to become packed and takes water slowly, it is incorrectly made and stimulation by feedings of any sort can afford at best, but a temporary relief.

Successful turf culture, really depends upon the care that has been taken in the early operation of seed bed making. Depth of rootage with easy passage of moisture and air and

with good moisture retention, must be prepared for in construction. A good organic matter, thoroughly decayed and fine enough to pass through a 1/10inch mesh screen, well mixed with the surface soil to a depth of five inches, will give the basis for easy maintenance. This preparation is but rarely made. Either the mixing of earth and organic matter will be slighted or the quality and quantity of organic matter used will be incorrect to properly separate earth particles, allowing reasonable porosity.

This is the major operation in all construction. Improperly carried out, we are exactly in the position a farmer would find himself with shallow ploughing and without the organic matter crop rotation would give. Good farming operations with farming equipment in seed bed preparation, is your assurance of dependable turf.

If unfavorable conditions exist and you dare not make reconstruction, nature will correct this physical condition if given an opportunity with a little help. If such conditions are found, the following can be suggested as a correction.

HOW TO CORRECT SOIL CONDITIONS

MULCH turf with the finest thoroughly decayed organic matter possible, to a depth of at least onequarter inch. Hot wind and sun at a temperature of 92 degrees F. will remove eight ounces of water from 72 square inches of exposed soil in eight hours. A light mulch of any coarse material will retard evaporation for nine and one-half hours. A mulch of very fine organic matter will retain eight ounces of water for 34 hours.

All growers have noticed how even a handful of twigs over turf will show a marked mulching effect. The finer the mulch the longer moisture will be retained. A mulch applied at this time of year, if fine enough, will be absorbed in the soil during the winter and gradually physical conditions will improve.

Proper fertilization during the next two months may be of great assistance. A well-balanced fertilizer is unquestionably necessary in the spring. If this has been liberally used at that time, the only requirement should be a slight feeding of nitrates to help keep up a healthy feeding balance. Ammonium sulphate, sanely used, should answer this purpose. Sodium nitrate has found some favor but it is generally conceded by the higher authorities that the use of sodium salts in plant feeding are rarely advisable. The slower acting soya bean meal or cottonseed meal when mixed with topdressings are probably the safer source of nitrogen at this time of year.

After the soil requirements of phosphorus and potash have been made early in the season, the continued use of high-priced complete fertilizers is an extravagance. Additional phophorus and potash will not be used or needed as there will be a balance of each left from former feedings. The nitrogen content, the very necessary item, has many cheaper sources.

ACID PHOSPHATE HELPS CLAY SOILS

I F GROWING conditions have been unsatisfactory on clay soils or upon soils largely clay, an application of from 300 to 400 pounds of ordinary commercial acid phosphate, applied before freezing in the fall, will uniformly make for better turf.

Watering practices have changed within the past few years and turf has been greatly benefited by the change. Good growers today water heavy and at rather infrequent intervals. Deep watering makes for deep feeding rootage and much healthier turf is grown as a result. Shallow sprinking to a depth of one inch, soon brings the rootage to that level and in extreme hot weather it is seldom that the turf can be saved. Not only is the soil moisture rapidly lost, but plant feedings in the top inch are quickly exhausted.

Where possible, fire hose with spray nozzle is the efficient sprinkling method for fairways and other large blue grass areas which have not been topdressed. Two men can apply 225 gallons of water per minute in this manner without damage to the turf. Simple and efficient systems are planned for this method of watering where creeks or ponds afford available water.

BEGIN MOWING IN THE SPRING

 $W_{\rm E}$ SHOULD begin mowing in the spring as soon as the grass first shows growth. From that time on to the beginning of hot weather, regular mowing, frequent enough to make short clippings, should be a habit. All grass stools rapidly in the early spring if mown close.

Clippings are an asset as a mulch if cut short enough to work through the turf onto the surface of the ground. Leaving short clippings on a putting green once a week, is a great aid to maintenance. These clippings accumulating slowly under topdressings will provide next year's humus to many greens that would otherwise have no addition of this sort. Moisture retention will be increased and best of all, a better home for our nitrobacteria will have been created.

Turf on slopes thrives poorly because of the wash of clippings into depressions during heavy rainfall. Two low clay knolls in a corn field from which litter has washed, shows a splendid example of this loss. The depression between the knolls into which the litter was washed, is dark and accumulated humus

July, 1933

and shows marked contrast in fertility with the area from which the accumulation was taken. Each fall, barren slopes should have large quantities of good organic matter disced in until turf develops sufficiently to stop the wash.

SOIL ACIDITY IS RARELY FOUND

S OIL acidity is rarely found in original fertile soils which have not received acid treatment. It may be found in the presence of decaying vegetation, but when found otherwise can usually be attributed to the aluminum content in clays. Acid phosphate, commercial, rather than lime additions, is the quicker corrective. An alkaline base such as lime or magnesium is absolutely necessary in all soils to aid in soluble nitrate production but their need is rare, unless acidulation of greens has used up the soils' lime or magnesium content.

The investment now shown in athletic fields, parks, campus grounds and polo fields, reaches staggering figures and as with the golf course, good turf is their greatest asset. Fortunately most of such areas have been planted to blue grass or mixtures with that seed as a base and their upkeep should be quite economical. A great many have not been constructed along lines best indicated for turf production, but their maintenance program should be a comparatively simple one.

A topdressing or mulch of at least one-quarter inch of good organic material, to be taken up by the soil in the winter is imperative.

Acid phosphate should be applied for suspected aluminum content in the soil.

A light feeding of either soya bean meal or cottonseed meal should be incorporated in the organic topdressing.

Watering should be heavy and not more often than two or three times a week.

Turf should be mown often and close up to June first, after that date heat and dry weather may necessitate longer turf for necessary evaporation.

We have had volumes of splendid literature on turf production offered in the past ten years, and all of it has been practically sane. With so much information, I am beginning to think that our turf producers, like some of our really good golfers, have become confused with so much advice. Let's slow up on our back swing, keep our eye on the ball and with a little more concentration, see if we cannot make the game an easier and more enjoyable one.

Golf In Sweden

Rapid growth of the world's best outdoor pastime has brought golf clubs into prominence in Scandinavia. Turf problems are important.

By PROFESSOR SVEN BRISMAN

IN SWEDEN, golf has not only a recent, but comparatively rapid growth. The late sunshine, due to the northern latitude, makes it possible to play the game after business hours and now royalty, as well as business men, are devoted to it.

The first known golfer in Sweden was Edward Sager, Master of the King's Horse, who in 1886 laid out a small private course near his country place for his guests to play on. Next to that an English clergyman in Gothenburg, the Rev. A. V. Despard, began to play with some of his friends in 1891 on a very primitive course outside the city.

A real course was laid out near Gothenburg in 1894 by Viktor Setterberg, but no regular club was formed until 1902, when the Gothenburg Golf Club came into existence; two years afterward this club got its present course at Hovas. Golf thus got its first secure foothold in Sweden.

In 1904 a second club was started, the Stockholm Golf Club. A couple of years afterwards these two clubs were joined by a third; and a fourth, the Falsterbo Golf Club, was founded 1909. Then, however, the development of golf in Sweden came practically to a standstill for a long time.

This history of golf in our country has been no case of "veni, vidi, vici." On the contrary, the game was for a long time barely kept alive by four small clubs. It was played in splendid isolation, by a mere handful of pioneers. It is otherwise, now. I wonder whether there has been in any country such a sudden change in the state of golf as in Sweden during the past five years. New clubs have sprung up everywhere, from Ystad on the South coast to Abisko beyond the arctic circle.

The course at Abisko (Bjorkliden) is very primitive, but it may be mentioned because it is the most northerly golf course in the world, where golf can be played at midsummer time by the light of the midnight sun. We have now seventeen regular golf clubs, and more are formed every year.

STOCKHOLM HAS THE BIGGEST COURSE

Most of these clubs are, of course, very small, the biggest being the Stockholm Golf Club, which has as many members as it can take, namely, about 400. This club has an eighteen-hole course at Sticklinge, Lidingo, but in 1932 it will move to Kevinge, Stocksund, where ground has been bought for a new course. This course will be very beautifully situated with a fine view over the sea. It has been laid out and constructed by the well-known firm, Colt, Alison and Morrison, and when ready, it will be first-class in every respect.

In the Stockholm archipelago we have also a nine-hole course at Saltsjobaden, the popular seaside resort, and next year a long and good eighteen-hole course will be opened at Djursholm. All these courses are situated only one-half hour from the city proper. As the old course at Sticklinge will probably be kept, we shall have four courses in the immediate vicinity of Stockholm.

ROYAL FAMILY GOES IN FOR GOLF

It should be added that the Crown Prince of Sweden is a very interested golfer, having for ten years been acting chairman of the Stockholm Golf Club. Other members of the Royal family, notably Prince Sigvard, are also keen golfers and have done much to promote the game in our country.

The Gothenburg course at Hovas is going to be extended to eighteen holes. At present our best courses are to be found at two of our most fashionable summer resorts, Bastad and Falsterbo in Scania. The Bastad course has been built by Hawtree and Taylor; it is about 6,300 yards long, and no cost has been spared to make it really first-class by its "de facto" owner, Mr. Ludwig Nobel, a nephew to the prize donor. It has already attracted visitors from many countries. Though situated near the sea it is rather of an inland character. The Falsterbo course, on the other hand, is what may be called an ultra-

Stockholm's Golf Club, Stockholm. Falsterbo's Golf Club, Falsterbo. Bastad's Golf Club, Bastad. Goteborg's Golf Club, Goteborg. Djursholm's Golf Club, Djursholm. Saltsjobaden's Golf Club, Saltsjobaden. Halsingborg's Golf Club, Halsingborg. Malmo's Golf Club, Malmo. Halmstad's Golf Club, Halmstad. Kristianstad's Golf Club, Kristianstad. Ystad's Golf Club, Ystad. Bedinge's Golf Club, Bedinge. Landskrona's Golf Club, Landskrona. Lund's Golf Club, Lund. Vasteras' Golf Club, Vasteras. Umea's Golf Club, Umea. Boras' Golf Club, Boras. Skovde's Golf Club, Skovvde. Ljunghusen's Golf Club, Ljunghusen. Saxtorp's Golf Club, Saxtorp. Norrkoping's Golf Club, Norrkoping. Borgholm's Golf Club, Borgholm. Marstrand's Golf Club, Marstrand. Angelholm's Golf Club, Angelholm. Torekov's Golf Club, Torekov.

The Swedish Golf Union

seaside course, situated, as it is, on a tongue of sandy land with the waves of the Baltic rolling in against it from nearly all sides. It is about 6,600 yards long.

The biggest competitions in Sweden are as follows:

(a) The Swedish Open Amateur Championships for gentlemen and ladies. These competitions are held at different courses, but mostly in Bastad and Falsterbo.

(b) The Bastad Open Invitation Tournament for amateurs and professionals. This is a 72-hole competition. The word "invitation" has been put in because it is impossible to guarantee that it will be held every year, but is open to everybody who wishes to take part in it.

(c) The Bastad Challenge Cup, the finest golfing prize in Scandinavia. This competition is played under handicap, maximum 18. All these competitions are international.

The standard of play in Sweden seems to be comparatively high, especially in view of the fact that until the last few years the number of players has been very small without any question. Mr. Stig Bostrom should be able to do well in any competition. He is known as a fine golfer far beyond the confines of Sweden.

Fertilizing Fine Grasses

By PROFESSOR LAWRENCE S. DICKINSON

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FOOD is essential to plant growth, but to believe that fertilizer is the panacea for all turf troubles is as wrong as believing the "little brown pill" will cure all the ills flesh is heir to. Fertilizer does not offset the effect of poor drainage nor will it make Timothy, Red Top or a low grade lawn mixture into a lawn turf, or correct construction errors. On the other hand, the intelligent selection and careful application of fertilizer will surely improve the appearance and health of any lawn. Furthermore, it is far better to fertilize and encourage a

poor lawn, than to plow it in and remake it.

A lawn should be fertilized with two objects in mind. (1) To replace in the soil the large amount of plant food that is removed in the form of clippings, and to restore the food elements that are lost by leaching from the soil. It is obvious that a close and frequent clipping of a lawn will cause it to need more food than if it is permitted to grow to a reasonable length and less frequently clipped. Also, the amount of plant food lost by leaching is greater in gravelly soils than in the heavier soils. (2) To provide the desirable grasses with food that is delectable, and to create a soil condition that is favorable for their development. Under such conditions any lawn grass will successfully compete with the undesirable grasses and weeds.

GRASSES OBTAIN FOOD FROM THE AIR

GRASSES obtain their food from the air and soil. From the soil it is obtained through the roots and must be in a liquid form. Therefore the fertilizers used must be so constituted that they are soluble in water, or may be chemically broken down by soil



PROF. LAWRENCE S. DICKINSON Massachusetts State College who is recogn⁵zed internationally as an expert on turf culture. We are greatly privileged to publish excerpts from his wonderful book.

bacteria and made available.

Grasses require seven elements from the soil: calcium (Ca), iron (Fe), magnesium (Mg), sulphur (S), phosphorus (P), Potassium (K), and nitrogen (N). The first four are usually present in all soils that would be considered for lawn purposes, and seldom is it necessary to include them in the fertilizer. However, once in five years an application of lime that contains magnesium will be an insurance against a complete loss of calcium and magnesium. Nitrogen, phosphorus and potassium are used in great quantities by

the grasses and should be supplied to the soil annually.

Nitrogen, usually considered as ammonia (NH_{a}) , is the element most used. An analysis of the clippings taken from the average lawn (10,000 square feet) will show that from fifteen to twenty pounds of nitrogen have been used in a season. It requires from sixty to eighty pounds of sulphate of ammonia to replace such quantities. More nitrogen is also lost by leaching, and such a loss must be considered in the fertilizer program.

TABLE VI—DESIRABLE PROPORTIONS OF AMMONIA, PHOS-PHORUS, AND POTASH TO USE WHEN A COMPLETE FER-TILIZER IS DESIRED.

Sail	Rents	Blue Grasses	Fescues
Clay low in humus	14-2- 2		
Clay loam	12-4- 2	12-4-2	8-4-2
Sandy loam (Sandstone)	10-6- 4	12-4-4	7-4-4
Sandy loam (granite)	10-6- 1	12-4-2	8-4-2
Average garden loam	14-4- 2	8-2-1	8-3-2
Weedless lawn	6-5-16		

NITROGEN PROMOTES LEAF GROWTH

NITROGEN promotes the growth of the leaf and stem, and the development of the stool, or crown. In the case of stoloniferous grasses such as creeping bent and Bermuda grass it greatly increases the rapidity of growth in the stolons.

Nitrogen is used in fertilizers in several forms:

1. Organic Nitrogen which is found in vegetable and animal matter.

2. Ammonia Nitrogen example, Ammonium sulphate (NH₄)₂ SO₄.

3. Nitrate Nitrogen example, Nitrate of soda NaNO2.

4. Synthetic Nitrogen. The nitrogen obtained from the air and combined with such elements as calcium, and carbon. Such fertilizers contain a very high amount of available nitrogen. Numbers 2 and 3 are classed as inorganic fertilizers.

All nitrogen to be available for the grass plant must be in the nitrate form. It is therefore obvious that nitrate of soda and certain synthetic fertilizers

TABLE VII-FERTILIZERS USED ON LAWNS

Name	*Average Analysis		Rate of Application pe 1000 Sq. Ft		
Ammonium Sulphate			Notes	Pounds	
(NH ₄) ₂ SO ₄ 20	- 0	- 0	Ac. C. Io. R.	5	
Ammo-phos 20	-20	- 0	C. Io. R.	5	
Blood, dried11	- 0	- 0	N. O. M.	10	
Bone-meal (raw) _ 41	/2-22	- 0	N. O. S. W.	18	
Bone-meal					
(steamed) 21	2-501	- 0	N. M. O. W.	22	
Castor Bean					
Pomace 5	- 11/	2- 1	Ac. M. O.	21	
Cottonseed meal 61	12- 21/	2- 11/2	Ac. C. M. O.	16	
Guano11	-15	- 0	Ac. M. O.	10	
Manure (stable)_ 1	- 11/	2- 1	Al. M. O. W.	50	
Milorganite 51	2- 21/	2- 1/2	Ac. M. O.	15	
Muriate of Potash 0	- 0	-48	Ac. C. Io. S. W.	6	
Nitrate of Soda16	- 0	- 0	Al. C. Io. R. W.	5	
Nitrophoska18	-30	-15	Al. C.	4	
Peat 21/	2- 1	- 2	N. O. S.	40	
Poultry manure 5	- 3	- 1	Ac. C. O. M.	15	
Sheep manure 2	- 1	- 2	Al. O. S. W.	20	
Sulphate of Potash 0	- 0	-48	Ac. C. Io. S. W.	6	
Superphosphate 0	-16	- 0	Io. N. S. W.	12	
Tankage 9	-15'	- 0	Ac. O. M.	12	
Urea45	- 0	- 0	C. N. O. R. Sy.	11/2	
Wood ashes 0	- 0	- 4	Al. O. S. W	30	

Notes—Ac—acid; Al—alkaline; C—caustic; C—very caustic; Io—inorganic; M—medium rapid; N—neutral; O organic; R—ready available; S—slow in action; Sy—synthetic fertilizer; W—encourage weeds. (1)—Bone phosphate.

*Expressed as nitrogen N, phosphoric acid \hat{P}_2O_5 , and potash K_2O_5 .

(those having the nitrogen in nitrate form) are the quickest acting nitrogen supplying fertilizers. Ammonia nitrogen must be converted by soil bacteria into nitrate nitrogen. The conversion takes place very rapidly and ammonium sulphate is second in rapidity of action.

Organic nitrogen is the most difficult to convert into nitrate form and therefore all organic fertilizers are slow to show effect, as compared with the inorganic fertilizers. Briefly, the process of converting organic nitrogen into nitrate nitrogen is as follows: During the process of decay of organic substances certain soil bacteria convert the organic nitrogen into ammonia, then another group of bacteria converts the ammonia into nitrate nitrogen. Some organic compounds give up their nitrogen more rapidly than others, and are known as quick acting, or quickly available, as compared with those compounds whose nitrogen is slowly available.

Nitrogen is usually expressed as ammonia in the analysis, and is the first element listed. To convert ammonia to nitrogen multiply the percentage of ammonia by the factor .82. To convert nitrogen to ammonia multiply by 1.215.

COTTONSEED MEAL IS EXCELLENT

GOTTONSEED meal is an excellent lawn fertilizer, but as the demand for this product is greatest by the dairy industry as cattle feed, the analysis usually found on the bag is in terms of protein, sugar, fat, etc. To convert protein into nitrogen divide the percent of protein by 6.25 and if the ammonia content is desired, by 5.14. Excessive use of nitrogen undoubtedly increases the grasses' liability to disease.

Phosphorus (P) is the second most used element. For the plant it is available in the form of phosphoric acid (P_2O_5), known to the fertilizer world as superphosphate. It produces strong root growth, especially in the spring and in young plants. Phosphoric acid, contrary to its name, is not acid and it is to avoid such a possible misunderstanding that the term superphosphate is used. Phosphorus is the second element listed in the analysis. In turf culture, an excessive use of phosphorus induces a strong growth of clover and weeds. Phosphoric acid is fixed in the soil and there is no loss by leaching. This fact is one of the reasons why a lawn fertilizer should not contain too much phosphorus.