

influence the growth of most grasses commonly used in golf greens. Certain investigators have pointed out that arsenate of lead used on grass land has actually stimulated plant growth. The Pennsylvania Department of Agriculture claims that "bent grass growing in poisoned soil is more vigorous and dense and has a better color than that growing alongside in unpoisoned soil." It is further asserted that certain weeds do not grow well in poisoned soil.

GRUB-PROOFING OF TURF

LAST August the U. S. Department of Agriculture issued their Circular No. 238 entitled, "Control of Larvae of the Japanese and Asiatic Beetles in Lawns and Golf Courses." This publication describes two methods of using arsenate of lead in the soil. One of these concerns the grub-proofing of a turf in the process of construction and the other where the turf has been established. In the first instance, the ground is prepared for seeding in the usual manner. Lead arsenate is applied at the rate of 35 pounds per 1,000 square feet and evenly mixed by cultivation in the soil to a depth of 3 inches. The poison should be applied with a filler such as sand, soil or organic fertilizer to make it spread more evenly. All lumps should be pulverized to effect a uniform mixture.

When established turf has been damaged the arsenate of lead treatment is applied in an attempt to build up a poisoned layer of soil at the surface. In this manner it is only hoped to keep the grubworm population below the number which will cause serious damage. The recommendations as to amounts of poison to be used vary from 5 to 10 and even 15 pounds per 1,000 square feet of turf depending on the density of infestation. This should be applied early in the season before the hatching period of the grubs. It is possible to use the entire 15 pounds in one application or to gradually build up the poisoned layer of soil by several applications. When top-dressings are applied throughout the season, lead arsenate should be mixed in each top dressing to avoid building up an unpoisoned layer at the surface.

Arsenate of lead may be applied in a liquid state by mixing it at the rate of one pound of poison to one or two gallons of water. It should be spread on uniformly and followed by watering to wash the material off the grass. The dry applications are

preferable because they do not require as much equipment and can be put on with distributors or if necessary broadcast by hand and worked into the soil with a broom. Two mixtures for dry applications are recommended by the U. S. Department of Agriculture as follows:

- (1) Arsenate of lead 1 part, tankage 2 parts, and sand 4 parts by weight.
- (2) Arsenate of lead 1 part, and sand 10 parts, by weight.

SOD WEBWORM

SOD webworm is a name applied to the growing stage of certain moths or "millers" called the "close-wing moths" or "snout moths"—so-called because their wings are held close to the body and their heads appear to bear a snout. More than 60 different species occur in the United States, all of which feed more or less on grasses. There are perhaps less than twelve of these that cause serious injury to turf.

The outbreak of 1931 stimulated interest in these worms whose injury in most years is usually passed unnoticed. Their habits and control have been discussed in the September, 1931, issue of THE NATIONAL GREENKEEPER by J. S. Houser of the Ohio Experiment Station and in the January, 1932, issue of The Bulletin of the U. S. G. A. Green Section by W. B. Noble of the U. S. Bureau of Entomology. For this reason only a brief summary of their habits is needed here.

The worm or larval stage of the close-wing moth spins a silken web in which to live while feeding on plants at the surface of the ground. It gnaws at the stems, frequently bores into them and many even climb the stems a short distance to feed on the leaves. Strong plants may survive this injury but lag behind uninjured plants. Weak plants soon decay and rot. When not feeding, these worms retire to the security of their webs, located just beneath the surface. When the worms are full grown, they are about one-half inch long, pinkish-white in color and studded with small, black tubercles. They soon transform to pupae in their silken cocoons and about 10 days later emerge as moths to lay eggs.

There are usually two generations a year. The moths of the first generation appear in May, June, or July, depending on the latitude, while the second generation moths appear in August and September. Eggs are dropped indiscriminately in grass land.

The larvae of the second generation hibernate over winter in their silken underground webs.

CONTROL METHODS FOR WEBWORMS DIFFER WIDELY

THE control recommendations of Houser and Noble in the publications mentioned above differ markedly. Noble worked out two treatments which he asserts gave good control. One of these involved the application of commercial pyrethrum extract at the proportion of 1 fluid ounce to 5 gallons of water which gave "a kill of practically 100 per cent." It was applied with sprinkling cans at the rate of 1 gallon to each square yard of surface. This material has the advantage of forcing the webworms to come to the surface. In a few hours they perish without returning to the soil and the operator can judge the results of his work.

Pyrethrum extract is expensive, costing about \$17.50 per gallon, making the cost for treatment of a 5,000 square feet of green about \$20.000. Pyrethrum is harmless to plants and if fresh material is purchased, control without injury is assured. The second and cheaper material which Noble advised is the use of Kerosene Emulsion made by emulsifying one-half gallon of kerosene with one pound of laundry soap in one gallon of boiling water. This stock solution is then diluted one part to 50 parts of water. It is then used at the rate of 1 gallon per square yard. The cost of materials for this treatment is about \$1.00 per 5,000 square feet compared to \$20.00 when pyrethrum is used. *Kerosene emulsion is, however, not always safe to apply and it may cause severe burning of the grass if not properly made or if used under different soil conditions.*

Noble found that the use of arsenate of lead for webworms only gave a maximum kill of 30 per cent. In the NATIONAL GREENKEEPER, Houser reports having obtained good control of webworms in Ohio using three-fourths of a pound of arsenate of lead per 100 square feet. At the Urbana Country Club from 5 to 10 pounds of arsenate of lead per green was used with good results and reports have come from several other courses in Illinois that satisfactory control was obtained with its use. Ten pounds of arsenate of lead per green would cost approximately \$1.50. The use of this material for grub-proofing turf as recommended for white grub control would to some extent help in the control of webworms.

Grub-proofing requires more of the poison which should be worked into the turf to kill insects which feed on the roots only. Against webworms the material need not be worked in as deeply because they feed on the grass stems at, or only a slight distance below, the surface. The discrepancy in results in the use of arsenate of lead tends to emphasize the point stressed at the beginning of this discussion that many factors enter into the control of soil insects and what will work under some conditions may cause harm to the vegetation or at least poor control in other situations.

ANTS

ANTS are common everywhere. They occur from the equator to the cold regions of the north.

Not only are they widely distributed, but they are also abundant wherever they occur. It has been said that there are more individuals of ants than of all other animals found on the land. They live in colonies which, in some instances, may endure for several years. These colonies are found in many kinds of situations. Those living and nesting in the ground are of chief interest here. Their nests in the soil are of different kinds. Those species which build large mounds over their colonies make themselves the greater nuisance on the golf courses. Some mounds are so small as to be scarcely noticed. Those mounds which are large constitute the chief concern.

Certain species destroy all vegetation surrounding the mound. One of these in the Western states is the Mound-building Prairie Ant. It cannot tolerate vegetation near its mound and it is cleared away as fast as it grows. Vegetation is apparently an obstacle to the ants coming and going, it affords a hiding place for its enemies and retains moisture after a rain which favors the growth of injurious fungi. Some of these areas cleared by the mound-building ants may measure as much as twenty feet or more in diameter.

The occurrence of such extreme mounds is comparatively rare on a golf course because they would ordinarily not be allowed to remain long enough to destroy such large areas of turf. Ants constructing smaller mounds are continually making their presence known on greens and fairways. Some species may not build mounds but simply loosen the soil and injure the grass in such areas.

The food of ants is as varied as their nest loca-

tions. A few species feed on planted seed, bulbs, and the bark of tender roots. This damage, which sometimes occurring in grass is so seldom noticed that it can be considered as negligible.

THREE CASTES OF ANTS IN A COLONY

THREE castes of ants are nearly always present in an ant colony—males, queens (fertile females) and workers (unfertile females). The males and queens develop wings which are lost after the mating flight. The workers are wingless. The workers and queens of some species are provided with a stinging apparatus. The males of all species are without a sting. At certain seasons usually after rains, swarming of the winged males and queens occurs. Enormous numbers leave their nest, take to flight and usually mate in the air. Upon alighting the females kick off their wings and enter the ground to form new colonies. The males soon perish after the marriage flight.

The new fertilized queen begins her colony by laying a few worker eggs. Until these are hatched and the young mature, egg-laying is suspended. With the help of workers now available, the queen limits her duties to egg-laying and may live many years doing nothing else. One queen was observed to live for 15 years in confinement.

Some ant colonies may contain many queens. As a result we find colonies in the soil may vary from those having a single, tiny entrance and a miniature mound with only a few tunnels and galleries below the surface, to those having extensive underground workings, mounds several feet in diameter and thousands of ants in it.

The successful eradication of ant colonies depends on the destruction of the queens which, unfortunately, once they have begun to lay eggs, seldom if ever come to the surface. The killing of some or all of the workers will not prevent the queens from laying more eggs and producing more workers. Heavy rains and other natural enemies may reduce the population of a colony but they are always able to repopulate and thrive again if the queens survive.

Many poisons are recommended and used against ants. They are usually composed of attractive sweets which contain a poison such as tartaric acid or sodium arsenate. The poison must be weak enough that it will not kill rapidly. The workers feed upon it and must live long enough to return to the colony where they feed the queen and the young

ants by regurgitation. One of the most successful poisons is known as the Argentine Ant poison. The formula is complicated and not easily made. It is used extensively in some of the southern states. Further information concerning it can be obtained from any State Experiment Station.

In the Northern states a poisoned syrup has been useful against outdoor ants. It is made as follows:

Sugar, 1 pound.

Arsenate of soda, 125 grains.

Water, 1 pint.

Honey, 1 tablespoonful.

The first three materials are boiled until the arsenate of soda is dissolved, after which the honey is added. This poison should be put out by soaking pieces of an ordinary sponge in it and then placing them in perforated tin boxes near the colony.

FUMIGATION NECESSARY IN ANT CONTROL

BBETTER success in controlling ant colonies in the soil is had by fumigation. Carbon disulfide gas is heavier than air and penetrates deeply into the soil. However, it is highly inflammable and must be kept at a distance from fire. To apply it, choose a time when the soil is warm and dry, punch holes about a foot apart into the larger nests with a cane or broomstick. They should penetrate until hard ground is felt. Into each of these pour one or two tablespoonfuls of carbon disulfide and fill the holes by pressing them with the foot. A wet canvas or blanket may be thrown over large mounds or several smaller mounds if they are close together. This gas penetrating through the underground galleries will reach the queen and all other inhabitants of the colony.

Calcium cyanide is useful in destroying ant colonies when used in the form of a dust. This material, when exposed to the moisture in the air, liberates hydrocyanic acid gas, one of the most deadly gases known. It should be purchased in the dust form. Holes somewhat closer together than for carbon disulfide are drilled into the mounds and with the aid of a funnel pour in one teaspoonful of the dust. An effort should be made to get this dust into the bottom of the nests as the killing gas is lighter than air and will rise to the surface. As with carbon disulfide gas, the holes should be closed to retain the gas as long as possible. *In using either gas, do not spill or scatter the material on surrounding sod as it will kill the grass.*

Municipal Course Maintenance

By H. W. STODOLA, *Greenkeeper*
Keller Golf Course, Saint Paul, Minn.

Reprinted from address delivered at the Annual Greenkeepers' Educational Conference in Chicago

MUNICIPAL course maintenance has characteristics of its own, and many that you are familiar with on your course. The greens range from sand to fine strains of bent. The sand greens are gradually being changed over to grass because of public demand.

Washington bent is the grass used on most courses. The course I am connected with has Seaside bent. Regardless of the type of bent it has to be brushed at least three times a season. If the greens are not brushed they become grainy and the better players dislike that. A power mower with brush attachment is the equipment used by most of the greenkeepers. Some courses keep this brush on their power mower all the time. It makes the grass upright and finer. It is the practice to brush and cut the greens closely before top-dressing.

When the grass is upright, the old branches are cleaned, and the dressing has to go down to the roots. Most courses top dress by hand, although mechanical spreaders have been tried. Monday is usually the day for dressing because play is quiet after Sunday and Saturday. The players object to paying the regular price when the greens are dressed. It is always an unpleasant job when the players complain. Topdressing can be done in a day when everything goes right. Sometimes the greens are not dressed as often as necessary because of interference to play. Three times a season should be the minimum for dressing.

The dressing can not be watered in immediately because it makes a mess for putting. For this reason fertilizer is only put in the dressing in the spring and fall. The weather is cool and there will be no



Mr. Stodola, young in years but old in experience, has made an intensive study of municipal golf course maintenance. He has succeeded, where others often fail, in conditioning his course above the average and within the budget. Good work and more power to him.

burning before water is applied. The first night after dressing, the water is applied by a hand spray. A sprinkler would splash the dressing away from the roots.

After that, it can be watered in with sprinklers. Usually one man does the watering at night. That means nine greens every other night, tees about three times a week, the practice green and nursery as often as necessary. The players stay around until dark and arrive at sun-up so it is impossible for the night man to get an early start or water late in the morning.

MUNICIPAL COURSES USE POWER MOWERS

MANY of the municipal courses cut their greens with power mowers. The men that do the buying for the city are interested in getting the greens cut fast. They do not look beyond that. The greens are cut closely with a power mower. In this way the greens can be missed every other day. The municipal standards of turf are judged by the play. As long as play keeps up to capacity the greens are all right. But in 1932 the play did not stay up to normal. Fees were cut but that was not the solution. The private courses lowered their green fees and encouraged outsiders to play. They got a taste of fine putting greens and now they expect it on municipal courses.

With increased competition from individually-owned fee courses and private courses, the municipal courses have to raise their standards instead of lowering their prices. Some courses have maintained this policy and use hand mowers on their putting greens. They claim that it is easier on the

greens. It helps to keep them the right softness for good growth and fine turf.

Hard greens cause pitch shots to go over and putts to skid. That takes time and holds up players. Our observation has been that public players like average speed greens. This is accomplished by a thick stand of grass. Proper feeding keeps the grass this way.

GREENS ARE FERTILIZED SPRING AND FALL

THE greens are fertilized with a complete fertilizer spring and fall. This fertilizer is mixed in the topdressing. It is applied early in the fall to build up the plant to carry over winter, and late in the spring to carry through the playing season. During the summer light applications of ammonium sulfate are applied in liquid form. Three pounds per thousand square feet. The sulfate is put on at night on account of the players. One man does the spraying while the other keeps the sulfate well stirred in the barrel. He also moves the hose around and watches closely for broken hose. They cover all the greens in one night.

But the greens need more than nitrogen and it is important to know what they need in the way of a complete fertilizer. This can be learned by testing the soils of the greens for nitrogen, phosphorus and potash, the three elements that are needed. There are testing outfits on the market that are simple and accurate. In the fall six-inch plugs can be taken from the greens. They should be marked and placed in a box of soil. In the winter, tests can be made. Phosphorus, nitrogen or pH, and potash content is found out.

A good green should test about 150 pounds of phosphorus and four hundred pounds of potash per acre. For bent grass the acidity or pH should be 5.5-6. Compare the soil tests with these figures and see how you stand. If the phosphorus and nitrogen are good but the potash is low, more potash can be added during the coming season. Tests can again be made the following winter to actually see if your soil shows more potash. You can also watch your greens in the summer and see if the additional potash has improved the tone of the grass.

GET AWAY FROM HIT OR MISS FERTILIZING

WE HAVE to get away from our hit and miss fashion of fertilizing. Some clubs use ammonium sulfate exclusively. Others use what the municipal purchasing agent buys for them. This is not sound

turf culture. The body must have well-balanced rations. Grass plants are the same. Successful farmers make tests for soil deficiencies. Good greenkeepers can do likewise. The science of turf culture has just been touched. By proper feeding the municipal greenkeeper should be able to produce a fine textured, upright grass, with toughness to stand traffic.

It is necessary to roll the greens in the spring. It is done before they dry out to take care of heaving from the frost. During the summer, spike rollers are needed to loosen the ground because of the continuous trampling of the players. When the greens get hard and packed the bent is forced out and poa annua comes in. It is a losing game to try and plug out poa annua. The man that changes cups does not have the time. Besides his cups, he is kept busy plugging out divots that are made by the players. The municipal player is realizing, however, that he can help keep the greens in fine shape. He is also becoming more considerate of the fairways and replaces his divots.

MANURE AND MUSHROOM SOIL FOR FAIRWAYS

MUCH-USED fairways need to be dressed with manure and mushroom soil in the fall. In the early spring the dressing is dragged in with a tractor. The stones, cinders and horseshoe calks are picked up by hand. Then it is time to roll the fairways before they have dried out. Sodding and reseeding is done before the spring rains.

Cutting is the biggest item on fairways, especially on municipal courses. Many of them have no roughs and cut most of the courses with fairway mowers. Seven unit mowers are used to save time. The players come from early morning until late at night so it is a job for the mower man to keep his fairways cut and not interfere with the players. Some clubs cut twice a week and others three. The courses with roughs have less fairway area. They have even narrowed these fairways one mower's width on each side. This saves on fertilizing, cutting and watering.

Some of the municipal courses have fairways which, during the dry seasons, have cracked so that it was impossible to drive over them with the mower. They filled them with peat because that was most available. The fairways are not cut until late in the spring so the roots can develop. They are

left long in the fall to more easily carry through the winter.

SOME COURSES DO NOT WATER FAIRWAYS

SOME courses do not water their fairways. That gives them less to cut. However, with watered fairways on other courses, municipal ones have to do the same. They are watered in the daytime by the hose system. Three-quarter inch hose is used because it is cheaper and because it is easier to handle. Two, three and four sprinklers are on each hydrant. This requires considerable pressure.

It keeps one man very busy to water the fairways properly. The golfers take no caddies and when their ball is under a sprinkler they pull the sprinkler by the hose until the ball is clear. They most likely leave the sprinkler on a place that has been watered before. It is inconvenient for the player and the waterman, but until the fairways are watered at night the best will have to be made of it.

The approaches are cut with power mowers. Most municipal courses have small clubhouses with simple lawns to take care of. Other courses have an elaborate clubhouse with a formal bent lawn, walks, and flower beds. This takes much more care and requires an active man that has pride in his work.

Fairway fertilizing and dressing is practically nil on a municipal course. Up to 1932 the courses have been earning at least 20% on their investment. Part of this profit should have gone back into the course but it did not. It went into a general fund to support the Parks. Municipal courses have much work to do on their fairways.

Our fairways, which are three years old, have been dressed twice with mushroom soil and fertilizer. They were missed last fall. Every penny I can save next season will be spent in the fall for fertilizing the fairways and trees.

TEES ARE A PROBLEM

TEES on a public course are a problem. In 1932 the municipal courses I have seen have given up hopes of maintaining grass tees. The players always shoot from the front of the tee and keep digging up the sod. To try to keep resodding them would be an endless job.

But on the Keller course grass tees are demanded. It has been a problem to educate the players to pay attention to the markers. If they would pay atten-

tion to the markers they would move from one end of the tee to the other. Then with dressing and fertilizing they could be maintained.

This is what we do. A six-foot strip across the tee is cut short between the markers. The rest of the tee is cut at least one-half inch higher. If they do not play from the strip they have to shoot off the long grass which they would rather not do. In addition to the closely cut strip between the markers we have a neat sign on every tee. It asks the players to please play between the markers. You can see our purpose. We are trying to educate our players to observe the markers. We even put an article in the Sports Section of the local paper thanking the players for their cooperation.

This educational program, of course, raises the cost of cutting tees. The man has to cut a new strip when the first one is worn. The grass is long so he has to cut several times to get a close cut. He moves the markers to the new strip. Then he has to raise his mower to cut the rest of the tee. When the markers are observed we can cut the entire tee the same length.

The tees are rolled in the spring and then resodding and reseeding is done. The topdressing contains the fertilizer. The tees are watered just enough to keep them alive because soft tees would soon be cut to pieces. Some courses cut the tee banks with hand mowers, others with scythes. It makes a much neater tee when the banks are trimmed every week. We believe in maintaining grass tees even though the costs are high. We also believe in roughs on a municipal course instead of all fairways. What extra we spend on our tees we save on our roughs.

MOST MUNICIPAL COURSES HAVE NO ROUGHS

MOST municipal courses have no roughs, but cut the entire course fairway length. Our course has roughs which are cut once a year with a hay mower. The grass is raked up and put in the compost pile. The dead trees in the roughs are given to the public who grub the trees out and haul the wood away.

Roughs are cheaper to maintain than fairways. They also teach the player to shoot straighter and improve his game. The reason municipal courses do not have roughs is to avoid lost balls. Lost balls hold up play and irritate players. In fact the policy has been to make municipal play as easy as possible so the players can score well and kick less.

TRAPS ARE SMALL AND SHALLOW

THAT is why there are few traps. The traps they have are small and shallow with little or no sand. Keller course has one hundred traps. They should be cleaned and raked. We plan on using a salt solution to kill the weeds in our fairway traps. If this works we will use it in our traps near the greens.

Raking traps on a municipal course is a disgusting job. The players have no caddies to smooth the tracks. They not only leave their own marks but deliberately walk through the traps when it is not necessary. We just rake for the tournaments. The rest of the time there is a sign in the golf shop giving the players the right to improve their lies in the traps. That satisfies the players and gives the greenkeeper additional help where it is badly needed—the turf nursery for instance.

TURF NURSERIES ARE SCARCE

VERY few of the courses have good turf nurseries. They barely get enough help and material to take care of the greens. It is important to have turf for patching in case of disease or injury.

Repairing equipment is not done in the golf course toolhouse. It is sent to the City shop and repaired there. Usually equipment is not repaired until it can't be used. Then work is delayed until it is returned. Equipment is used on the golf course today and in the parks tomorrow. It is hard to exchange equipment and then have to wait for it. It is an advantage to be able to have the equipment repaired in your own shop.

Preparing of topdressing can stand much improvement. Very few municipal courses have a far-sighted compost plan. They just make compost from season to season. The greenkeeper is not given enough leeway to build for the future. The policy is to make all they can on the golf course and spend it elsewhere. Municipal courses can not topdress any more than necessary.

KELLER COURSE HAS THREE YEARS OF COMPOST

THE Keller course is ahead of itself three years on compost. It has a compost field that is planted to leguminous plants and grains. It is plowed under twice a year. One compost pile is two years old. A new pile was started last year. These piles contain manure, sod, and loam. The sand is added later. The piles are in one foot layers, six to eight feet high,

hollow on top to catch and hold water. Each year they are turned over with a steam shovel.

At our tool house is a long shallow pile of peat. The tool house contains a topdressing plant.

HOW OUR TOPDRESSING IS MIXED

ON THE first floor are two bins for finished topdressing, holding fifty-six yards. There is also a bin for compost, two bins for peat and one for washed sand. The truck hauls in compost which is at least three years old. This is dumped near a hopper where it is shoveled into a hammer mill to be ground up. A small elevator carries the ground compost into a bin. When this is filled, peat is hauled to the same hopper. It is shoveled into the hammer mill, ground and elevated into the two bins for peat. Sand is hauled in, shoveled in the hopper and elevated to the sand bin. It is washed sand and does not go through the hammer mill because it is fine enough already.

Now on this floor is a bin of ground compost, two bins of ground peat, one bin of washed sand. There is a metal hopper with opening at the bottom of each bin. On the basement floor under this row of bins is a narrow track. A four-wheeled dump cart with a scale on it can be pushed under these bins. First a hundred pounds of compost is taken in to the cart, just by opening with a lever. Then two hundred pounds of peat and one hundred pounds of sand. Now the truck is at the end of the track next to a large concrete mixer. Here the Calomel, complete fertilizer, and arsenate in the proper proportions are added to the load. Then a side door is opened and the truck is emptied into the mixer.

A perfect mixture is obtained, which falls into elevators that carry it upstairs to the topdressing bins. These bins have shoots leading to the outside, where the truck can be quickly loaded. The advantages of this topdressing plant are 100% efficiency in grinding because all of the raw material is used, proper proportioning because everything is weighed, perfect mix because of the mechanical mixer, and dry topdressing because of the storage bins.

We use one part compost, two parts peat, and one part sand in our topdressing mixture because it has given us good results. Calomel is used in the fall dressing for snowmold. It is used in the spring and midsummer dressing for brown patch. Arsenate of lead is used for grubs, angle worms, and weeds.

New Jersey's Turf Conference

Report of the 1933 annual renewal of this historic and valuable contribution to the intricate problems of turf culture.

By DR. HOWARD B. SPRAGUE,

*Agronomist in Charge, New Jersey Agricultural Experiment Station,
New Brunswick, New Jersey*

THE annual turf conference was held at the New Jersey Agricultural Experiment Station, New Brunswick, N. J., on March 9, 1933. There was an excellent representation of approximately 150, including greenkeepers, chairmen of Green Committees, professionals, landscape architects, gardeners, seedsmen, and organizations specializing in turf supplies. In opening the program, Dr. Howard B. Sprague made the following statement:

"We are gathered today to discuss a subject touching the everyday life of practically every individual in the several communities which you represent. One needs but to recall that within the confines of New Jersey alone, there are nearly 500,000 home lawns and private estates; a very large number of parks under municipal, county or state supervision; athletic fields, school grounds, and parked areas adjacent to public buildings; and approximately 120 golf courses."

OVER FIVE MILLION DOLLARS SPENT ON TURF IN NEW JERSEY

THE total sum required to maintain the turf on these grassed areas during the past year was most certainly in excess of five million dollars, and probably approached more nearly 10 million dollars.

The relations between our population and the available recreation grounds which exist in New Jersey find their counterparts in the metropolitan areas of New York City and Philadelphia. We may well ask in these troublous times, whether there is a real need for the recreation grounds now in existence, and if means cannot be found for reducing maintenance costs without injury to the condition and use of such turfed areas as are essential."



Doctor Sprague is not only a thoroughly practical turf expert with a fund of experience behind him but he also has that rare gift of attracting men to him for guidance and instruction.

Due to an emergency, Dr. Jacob G. Lipman, Director of the New Jersey Agricultural Experiment Station, New Brunswick, N. J., was unable to be present for the opening address. The introductory message on proper use of land for recreation grounds, by Dr. Lipman, was read to the conference. Dr. Lipman pointed out the great need for such recreational areas in regions as densely populated as the metropolitan areas surrounding New York City, Philadelphia and Trenton.

R. F. Arnott, chairman of the Green committee of the Upper Montclair Country club, Upper Montclair, N. J., discussed the problems of golf course management from the Green chairman's viewpoint. It was noted that considerable reduction in budgets would be possible through the substitution of labor by machinery. However, the replacement of employees of long standing by machinery was not advised, but that a means be found of providing such individuals with adequate support in the present emergency.

The greenkeeper's position in these trying times was admirably set forth by T. H. Riggs Miller, North Jersey Country club, Paterson, N. J. The conference provided an excellent opportunity for greenkeepers to call the attention of both the golf club officials and players to the absolute necessity of maintaining the turf in a healthy condition if economy at this time is not to result in extra expense later on.

MACKIE SAYS TRIVIAL THINGS ARE IMPORTANT

JACK B. MACKIE, Inwood Country club, Far Rockaway, Long Island, brought out the interesting fact that it is the trivial things on the golf course

which are likely to disturb the players. The correction of these small matters does not necessarily involve great expense, and the average player may be kept quite content even though the budget is considerably reduced as compared with former years.

The afternoon program began promptly at 1:30 o'clock with a discussion of the new advisory service on turf culture, established by the New Jersey Agricultural Experiment Station for the benefit of golf courses, landscape architects, and other organizations. The advisory service is of two types. (1) Visits by a technical expert for a survey of conditions and recommendations for correcting situations likely to prove harmful to maintenance of the turf. (2) A laboratory service providing for the analysis of soils from the standpoint of proper growth of grasses, identification of diseases, plant specimens, etc., and determination of undesirable conditions displayed by such samples, by the technical staff.

Dr. Sprague emphasized the fact that this service is rendered on a cost basis, and no attempt will be made to place it on a profit basis. From all indications, this type of service which has been in existence for nearly a year, has proved most helpful to both golf clubs and commercial organizations interested in turf culture.

DR. EVAUL CITES WEAKNESSES IN TURF MAINTENANCE

"SOME common weaknesses in turf maintenance programs" was the topic discussed by Dr. E. E. Evaul, who has served in the capacity of field technician in connection with advisory service during the past year. The presence of layers of organic matter and sand in green soils was noted as one of the important causes of difficulty experienced on golf courses in the past year. The failure of greenkeepers and golf club officials to cooperate was frequently the cause of friction.

The balance of the afternoon was devoted to presentation of recent research on turf management and its practical application. The following topics were discussed by Dr. H. B. Sprague: Studies on the root development of turf grasses as affected by fertilizers, height of cut, and season; water storage by soils in relation to fertilizer treatment and acidity; substitutes for manure in soil improvement and composts; and, fertilizers for turf grasses.

Although the conference closed officially at 4:30 p. m., informal discussions were continued for a considerable period. From all indications, the conference was entirely successful.



—Photo by George H. Pound.

GROUP OF GREENKEEPERS AND OTHERS INTERESTED IN TURF CULTURE WHO ATTENDED THE FIFTH ANNUAL SHORT COURSE AT THE NEW JERSEY AGRICULTURAL EXPERIMENT STATION, NEW BRUNSWICK, FEBRUARY 20-24

Minnesota Notes

T By HAROLD W. STODOLA, *Secretary*
 THE Minnesota Greenkeepers' Association had their monthly meeting at Minikahda Club, Monday, March 13, 1933. Twenty-five members were present. Charles Erickson had a sand model of a green he plans to rebuild. In fact he showed the entire hole from tee to green. The model was open to the inspection and approval of the members of his club. It is surely fine to iron out the criticisms before reconstruction and then forever after let everyone hold his peace.

Snow mold was discussed among the members. So far this district has been spared, but just today we had a snowfall with partially frozen ground underneath. We must watch closely until the greens are bare again. Keller Club has some perfect specimens of snow mold kill on their Virginia bent lawn.

Most of the clubs have their equipment thoroughly overhauled and painted for the coming season.

All the courses will open this spring and a touch of warm weather has heated up the golf enthusiasm.

New England Gossip

By GUY C. WEST

*O*NE of the most important meetings held this year was the meeting sponsored by the Massachusetts Golf Association Service section and the Greenkeepers' Club of New England, held on February 27 at the Braeburn Country Club.

More than two hundred club officials and greenkeepers discussed together club and golf course problems. Talks were given by President Jacques of the U. S. G. A., President Cross and Secretary-Treasurer Wentworth of the M. G. A., Manager Sherman and Green Chairman Sawyer of Braeburn, Charles Parker and Guy West of the Greenkeepers' Club.

The Greenkeepers' Club of New England has presented a strong program at the indoor meetings this winter. At the February meeting, Henri Haskins of the Massachusetts Experiment Station, for over forty years as Control Chemist, spoke on "Fertilizers." Professor Dickinson of Massachusetts State College reported at the March meeting on the results of the pre-seeding fertilizer experiment conducted by him at the college this past year from funds supplied by the Greenkeepers' Club. Some thirty members of the winter schools for Greenkeepers were guests at this meeting. The speaker for the April meeting is Dr. Howard Sprague of the New Jersey Agricultural Experiment Station.

Some three hundred greenkeepers and others interested in turf problems attended the two-day exhibit and conference presented by the winter schools for greenkeepers at the Massachusetts State College, March 11-12. The exhibits were many and varied, and included several thousand dollars' worth of golf course equipment.

Pacific Coast Gossip

By ARTHUR LANGTON

*P*OPULARITY of golf courses in Southern California received a sudden and violent impetus on March 10 with the arrival of the earthquake which created havoc in Long Beach.

The building-free spaces of tees, fairways, and greens seemed havens of safety to many players whose houses and office buildings continued to be rocked by a series of tremblors, the aftermath of the original shock. Greenkeepers in the stricken area reported that the greatest damage to their courses consisted in water lines being pulled apart by the seismic contortions of the earth.

Three days after the quake greenkeepers of Southern California held a meeting at the Meadow Lark Golf course, formerly the Long Beach Country club. During the course of the gathering the ground trembled continually but the attendance was good and everyone stayed, perhaps because the group convened out-of-doors.

This was the first meeting held with the newly-elected officers of the Southern California association presiding. The recently elected executives are: president, W. E. Langton, San Gabriel Country Club; vice-president, L. N. Boynton, Hacienda Country Club; secretary, L. T. Parker; treasurer, Robert S. Greenfield, Wilshire Country Club.

News from the South

By MERLE ZWEIFEL

*A*PPARENTLY the dreams of a thirty-six hole municipal golf course with grass greens and watered fairways at Mohawk Park, Tulsa, Oklahoma, will become a reality within the next few months.

The Tulsa Park Board has completed arrangements for building the course and contract was given W. H. Diddle, well-known architect of Indianapolis, Ind., for construction of the greens to replace the old sand greens now in use. The project will give part-time employment to over 200 men and a portion of the funds for building this course will be made available through the R. F. C. "made work" program for the Tulsa district. The greenkeeper for the course has not been named.

SCIENCE REPLACES GUESSWORK

During the past winter several greenkeepers throughout Tulsa and the Kansas City district have taken up a study of chemicals that, when properly used, gives a more exact check-up on the condition of the soils. Various soil testers have been introduced and with these sets the greenkeepers believe they can determine the soils that need the fertilizers worst and thereby eliminate a large amount of waste.

On some links the soil on each green has been carefully studied and only the necessary amount of plant food will be applied. Such a plan will result in a substantial saving for the club in fertilizer costs.