

more privileges and maintain a larger waiting list.

"Who Pays?" is what every member should know. Keep up the good work.

K. L. (Iowa)

Business Must Warrant Operation

"Editor,

"GOLFDOM,

"Chicago.

"Sir:

"The article, 'Who Pays?' is excellent and will bring home particularly to members that if they want a club and clubhouse to really be prepared to meet their every want at any time, they must patronize the institution so that it may be able to cater to its members efficiently.

"The rules applying to a business apply to a club. You cannot expect your neighborhood store to be able to supply your every need unless business warrants carrying a varied stock.

"The article will make members think before they kick—let us hope.

"Sincerely,

"E. W."

(New York)

"Finest and Most Complete"

"Editor,

"GOLFDOM,

"Chicago.

"Sir: We have read with intense interest the article, 'Who Pays?' in the July issue of GOLFDOM. In my opinion this is the finest and most complete article ever written on the subject.

"We are desirous of securing 350 reprints of this article. Will you please advise if you will be able to furnish them for us and what the cost will be.

"Thanking you, we remain,

Very truly yours,

J. R. (Detroit).

Too Cold-Blooded

"Editor,

"GOLFDOM,

"Chicago.

"Sir:

"When it comes to printing real up-to-the-minute golf club articles, GOLFDOM bows to no competitor. The direct cause of this sweeping statement is the article 'Who Pays?' in your July issue. It is a ten-strike at the fundamental weakness in present day club organization.

"My only criticism is that few clubs can afford to be as cold-blooded as your author says his club became. If we asked our relatively inactive members to resign, we couldn't replace them—we are in a small town and all the golfers in town belong to this club.

"I hope 'Who Pays?' encourages further contributions to your excellent pages on this same subject. Surely somewhere in America, some golf club has met this problem and licked it. Why don't you issue a special appeal for succor? There must be an answer.

"Cordially,

"G. N. P."

(Kansas)

Thinking Backward

Editor,

GOLFDOM,

Chicago.

Sir:

"I congratulate you on your good fortune in getting the house-chairman who wrote 'Who Pays?' to tell of his club's procedure in securing an equitable distribution of club costs among its members.

"We have been thinking backward in the financial operation of golf clubs. We pay far more attention to spending the money than we do to getting it. While golf clubs customarily are organized 'not for profit' they are not organized for the deficits that are far too common, and nine cases out of ten are the result of lack of expected patronage from members who shirk their club responsibilities.

"I think the day will come when the better golf clubs will establish a quota of club patronage per member and in taking in new members require a deposit sufficient to cover this quota for a few months in advance. I recall mention made in GOLFDOM some time ago of a 'certificate of deposit' idea being used in the financing of a new clubhouse. A combination of this idea and the establishment of a set minimum annual house account, as a requirement for membership, would relieve us of the financial problem that is so serious with many clubs at the present time.

"Assessments are not the answer. The equal participation of each member in the club's activities is obviously the rational solution."

Sincerely,

W. R. (Pennsylvania).



A vista at one of the newest and fine public courses, the Galloping Hill course, constructed and operated by the Union County Park commission, Elizabeth, N. J.

Doing Away With Weeds

By B. R. LEACH

THE spectacle of five or ten boys or men reclining in more or less graceful attitudes at spaced intervals over the topography of a golf green, each more or less assiduously engaged in digging out the festive crab grass with a dull and rusty knife, is still altogether too commonplace in this age of efficiency. When a green gets into a condition where wholesale hand weeding must be resorted to it is simply another instance of locking the stable after the horse is stolen. The greenkeeper is a busy man and during the season of maximum weed growth he is pushed to the limit to maintain the course in fair playing condition for the period of yearly maximum play which corresponds usually with this period of heavy weed growth. Under the circumstances the greenkeeper cannot be entirely blamed for letting the weeding go until rank growth reaches a stage where there is no fun in it. When a green, heavy in weed growth, is finally weeded it has all the aspects of a singed cat; thin turf, spotted and pitted with the holes left by the knife, rough and uneven and entirely unsuited for the de luxe putting of the effete, present day golfer. Then follows a distracting period of topdressing, fertilizing, etc., with the object of nursing the green back into

shape, all of this taking place at a period of the year when the growth of the grass is naturally slowing down. Year after year the struggle continues. It is no wonder that half the time the greens are in poor playing condition.

That the above system of hand weeding is out of date and not in keeping with the present day system of doing things in a so-called scientific manner, goes without saying but some years will yet elapse before the system of wholesale hand-weeding will give way to the cheaper and more efficient system of weed control by the use of certain chemicals, notably, ammonium sulfate and arsenate of lead.

Ammonium Sulfate's Virtues

Ammonium sulfate has been in extensive use for several years as a fertilizer and weed control agent in fine turf. It is a valuable chemical and has its place in the scheme of things. Its fertilizing value has never been seriously questioned but its weed-controlling value has been the subject of much discussion, pro and con, and not by any means all con. This condition of affairs is no one's fault in particular but is due to a combination of circumstances of a rather complex nature which I shall try to explain at this time.

When ammonium sulfate was first advanced as a weed control agent it was hailed with a fair measure of acclaim by the more progressive fraternity of turf enthusiasts. They proceeded to give it a thorough try out. Some of these experimenters were hot-blooded and the compound was altogether too slow in its action to satisfy them. Consequently we have passed thru a period of years in which ammonium sulfate has been the target for all the gibing shafts of many who think they know a lot about turf and in reality don't know much. Some of these boys are still knocking. In extenuation of this school of thought as regards ammonium sulfate I will say that in my opinion just a little bit too much has been claimed for this compound in the past than can be entirely justified by subsequent experience.

On the other hand the more conservative of the amateur experimenters with ammonium sulfate continued to test it and say little or nothing during the extended process. As a result of several years of this testing they have arrived at certain conclusions, sound, conservative and based on solid fact. Hark for instance to the written opinions of Joseph Valentine, greenkeeper of the Merion Cricket club, Haverford, Pa. I have known Mr. Valentine for a good many years, and take this opportunity of advising all and sundry that, in the vulgar parlance of the day, he knows his onions.

Valentine's Experience

In the current issue of the *Bulletin of the Green Section*, page 122 he writes as follows: "Sixteen years ago the fairways of the east course of the Merion Cricket club, were seeded with a mixture of Kentucky Blue grass and South German mixed bent. The following year the fairways of the west course were seeded with the same mixture. Our fairway fertilizing program then included the application of bone meal, mushroom soil, nitrate of soda, and some limestone, especially where we believed the soil to be acid. In 1920, eight years ago, our fairways were covered with crab grass, goose grass and clover. In the latter year we discontinued the use of nitrate of soda and in its place began the use of sulphate of ammonia. The weeds in the fairways have since been reduced about 80 per cent, and the clover almost 90 per cent. In fact, there is practically no crab grass in our fairways at this time. We expect to have all the weeds and clover com-

pletely eradicated within the next few years."

"This year, for the first time, we have also used activated sludge on our fairways, mixed with arsenate of lead at the rate of 500 pounds of the sludge and 40 pounds of arsenate of lead per acre. The arsenate of lead is used as a grub control and also to eliminate chickweed, which has started to appear prominently on some of our fairways. Last year we used arsenate of lead on our putting greens, applied mixed in top dressing at the rate of two pounds per 1,000 square feet of surface. We did not have to remove a single plug of chickweed from the greens, as had been necessary previous years, and very little of the so-called fall grass (I presume he refers to *Poa annua*) appeared on the greens."

Mr. Valentine then goes on to say that three applications of ammonium sulfate are applied annually, each consisting of 150 pounds per acre, the first in early spring, the second in July and the third the middle of September.

Suppose we take the time to analyze the two paragraphs above as written by Mr. Valentine. By doing so I believe it will be possible to readily explain the course of events at the Merion club and also to show the reasons for the changes in the fairway turf as they occurred.

Soil Nature Changes

Prior to 1920 they used bone meal and nitrate of soda and some limestone, so that while in all probability the soil was neutral or slightly acid at the inception of this fertilizer program they nevertheless gradually changed the nature of the soil, causing it to become alkaline. This program could result in only one thing if continued long enough; it simply made the soil less suitable for the fine turf grasses and more desirable for the weeds, hence the weeds flourished. In 1920 they faced about, discontinued the use of nitrate of soda and other fertilizers with a tendency to make the soil alkaline, and began the use of ammonium sulfate which has exactly the opposite effect on soil. They thereby began the long uphill fight to change the nature of the soil from the alkaline to the acid. Believe me when I say that this is some job with the chemicals we have available for this purpose at the present time. As the ammonium sulfate was applied year after year the lime was gradually worked out of the soil and the latter gradually took on an acid reaction. In this operation they were aided by the fact that the soil

was in all probability of a naturally acid nature to begin with and no watering with lime-impregnated water was resorted to. As a result of eight years of this continued treatment the weed growth has been appreciably reduced, the clover almost eliminated and the grass is going strong.

It is fairly obvious that there is nothing of a quick acting or spectacular nature in the results obtained from the use of ammonium sulfate as a weed control agent. The weeds do not disappear overnight, in fact it is not a question of days or weeks in obtaining weed control with this compound but rather a question of consecutive years of consistent and persistent treatment, hence the impatience of those who demand quick results.

The experience of Mr. Valentine with this chemical has been reasonably satisfactory because his course is located in a section of country where the soil is naturally slightly on the acid side. Under these soil conditions every bit of ammonium sulfate applied gets in its good work and gradually but steadily increases the acidity of the soil, although in this case it required a longer period of time due to the previous applications of limestone, bone meal, etc.

Alkaline Condition

Let us suppose, on the other hand, that your course is located on naturally alkaline soil, high in lime content, such as is prevalent in large areas of the middle west and where in all probability every drop of water used for artificial watering is impregnated with lime. Under these conditions ammonium sulfate is just as good a source of nitrogen as any other fertilizer, but it is my candid opinion you will never be able to safely apply enough ammonium sulfate in ten years of consistent treatment to make that soil acid and thereby obtain any degree of weed control. The lime content of the soil and water is too big a handicap for the limited amount of ammonium sulfate which can be applied annually with safety.

On many courses all the expected weed control from the use of ammonium sulfate is counteracted by the soil, sand, etc., used in topdressing, any or all of which may be barely on the acid side or even alkaline in nature, so that the ammonium sulfate in the limited quantities applied is entirely incapable of counteracting the alkalinity of the relatively huge bulk of soil annually applied.

To sum up the situation: if the soil of your golf course is not naturally alkaline and you take care that all materials such as soil, sand, fertilizers, etc., applied to the turf are not alkaline, then ammonium sulfate will return dividends as a weed control agent apart from its fertilizing value. If your soil is naturally not alkaline but has been artificially rendered so by the use of lime or alkaline fertilizers, then the use of ammonium sulfate will change this soil condition and pay dividends, *but* it will be a long drawn out business, a matter of years and not months. If your soil is naturally alkaline and your water supply is impregnated with lime, then ammonium sulfate is one of your best fertilizers as a source of nitrogen, but you might as well forget it as far as weed control is concerned.

To become more specific as regards the action of ammonium sulfate on the more common weeds infesting golf courses it may be said that the action of the chemical on clover, under the limitations of soil type outlined above, is the most striking. Clover gradually disappears over a period of years when the ammonium sulfate does not have too much alkalinity to counteract. If the opposite condition prevails, then the clover will persist. The effect of the chemical upon goose grass is comparable to that upon clover.

Crab Grass Control Uncertain

When it comes to the question of crab grass control by means of ammonium sulfate it may be said that greenkeepers and turf enthusiasts are divided by their opinions into two armed camps. Some say yes, some say no and say it profanely. It is my personal opinion that the compound is overrated as regards its effect upon this weed. At best the chemical only seems to discourage the crab grass in a measure. The result is not clean cut.

Referring again to the excerpt from Mr. Valentine's article as given above you will note that he has turned to the use of arsenate of lead for the control of chickweed, this matted growth having appeared in the fairways and greens in spite of an eight-years' consistent application of ammonium sulfate. They have had the same experience with chickweed at the Pine Valley Club at Clementon, N. J. In the years prior to 1927 tons and tons of ammonium sulfate had been applied to the fairways and greens, and yet the chickweed consistently increased. It was entirely

cleaned up in one season as a result of the grubproofing operations during 1928, using arsenate of lead.

Prior to the advent of arsenate of lead into the turf maintenance system, ammonium sulfate was the only chemical which gave a measure of weed control results. It is still the only chemical which reacts against clover, providing there is not too much lime content in the soil to be overcome. I say the only one, because clover is apparently entirely indifferent to the presence of arsenate of lead in soil and grows normally in grubproofed soil provided the latter is not too acid in nature. The sulfate is slow in its action on weeds and will give only this degree of results when soil conditions are favorable. Arsenate of lead, on the other hand, is quick in its action on the weeds it affects, gives a very high percentage of control and will work in *any* soil, regardless of whether it is acid, neutral or alkaline. For the control of such matted-growth weeds as crab grass, chickweed and the death-defying *Poa annua* the compound has no equal at the present time. In next month's article I propose to discuss the use of arsenate of lead as a weed control agent, detailing its weaknesses and strong points, bringing out the more important points to be observed in its use for this purpose.

Cedarbrook's Fertilizing Is Successful, Thrifty

By LOUIS M. EVANS, Greenkeeper

Cedarbrook Country Club

THE system for fertilizing the fairways and the material used has proven most satisfactory and gratifying here at Cedarbrook and this is written in the hope that other clubs may benefit from this "not too expensive" a method of fertilizing. In 1926 we purchased 42 tons of chicken manure just as it comes off the car. This was put into a stock pile and when the ground was frozen about a half inch we decided that it was now time to start. The truck was loaded with chicken manure and taken to the point where the dirt was to be loaded and there dumped. The ground is grubbed or picked and as the lumps of dirt are thrown into the truck one-quarter of the truckload of manure is added to the dirt. I have used the words "lumps of dirt" for the reason that the more severe

the slopes of the fairways the larger we tried to have both the lumps of dirt and manure. This idea was introduced by the chairman, now our president, Mr. Charles Havey and that we get wonderful ideas from men not in the line was proven in this case as in many others. The idea of the lumps on the slopes is that they dissolve slower and do not wash away as would the fine dirt and manure. The latter we put on the more level fairways that are not subjected to severe wash.

The mixture of one to four is hauled on the fairways and dumped and spread with shovels, care being taken to pick out such places as show need of fertilizing. We continued this treatment until we covered every bad spot on our fairways and the results now speak for themselves.

This mix is washed into slight holes on the fairways and helps to level up slight depressions left from divots and also stimulates the grass in those places. It is my opinion that where your thought is only to stimulate grass growth that you can put on the straight manure in the freezing weather without fear of burning. In the spring we hand pick such trash as was in the manure or soil and then watch for results. The same mix of one to four is fine for greens with one third sand added for spring compost.

The greens compost should be kept under cover for chicken manure is a dampness retainer and can only be worked properly when thoroughly dry. The seeding of fairways we do in the spring, using about 1000 pounds of 65% blue grass and 35% red top and this is put on with the wheelbarrow seeders. This amount is usually enough for courses of about 6500 yards.

IF your club publishes a news-bulletin or magazine, put GOLFDOM on the list to receive a copy of each issue. We frequently find ideas in club magazines that develop into worth-while articles for the pages of GOLFDOM. Thank you.

HEAVY greens are more subject to brown-patch than closely cropped ones. Accordingly, the mower blades should not be raised in summer. It is better to have fast greens and a few kicking members than ruined ones and the whole membership down on you.



Plenty of clearing was necessary during the construction of the Sandy Beach (Ohio) course, but utilization of modern, cost-cutting machinery such as the Caterpillar tractor shown here, resulted in a job of record speed and thrift.

Watch Construction Pitfalls

By O. J. NOER

BUILDING committees charged with the construction of new courses are rarely conversant with the basic principles underlying the production of good turf. In their zeal to reduce construction costs they are often penny-wise and pound-foolish. Essential fundamentals are omitted for the sake of economy and the club is forced ultimately to expend huge sums to effect turf improvement. Incidentally the club revenues are seriously restricted during the first few critical years because golfers are not easily induced to join and retain membership in clubs possessing poor turf on fairways and greens.

Terrain and accessibility are usually considered more important in the selection of a golf course site than adaptability of the soil for turf growth. Now that manure is scarce and expensive, farmers in the vicinity of large cities are not maintaining soil fertility, anticipating early sale for sub-division or golf course use, so the soil may be badly depleted if the course is established on farm land. Failure to recognize this has been disastrous to many new clubs.

Critical Period

The first weeks following seeding are most critical and determine success or fail-

ure in obtaining dense uniform turf quickly. Occasionally poor turf can be traced to unfavorable weather, but more frequently it is the result of adverse soil conditions, usually improper texture, insufficient drainage or depletion of essential plant food elements. The physical condition of heavy soils cannot be successfully modified after turf is once established, and surface application of certain fertilizing elements do not diffuse rapidly into such soil. Failure to modify soil and provide plant food prior to seeding hampers any subsequent attempt to turf improvement.

Neglect to provide soil of suitable texture (refers to the size of the predominating soil grains, and, silt or clay during construction of greens is responsible for more distracted green chairmen and greenkeepers than all other mistakes combined. The extravagant claims of some bent enthusiasts, that stolons will grow anywhere, might lead one to suppose that bent grass will thrive on cement slabs. While bent seems to grow under a wide variation of soils, good putting surfaces are not easily maintained on greens constructed of heavy silt or clay.

The character of the surface four inch layer of soil is most important. If too sandy it has such low water holding capacity that the surface soil dries out rapid-

ly during hot weather. Clay soils, while they have a greater capacity to retain that the ball will not bite when pitched to water, become so hard during the summer the green. The very fine pores between the soil particles impede the free movement of water and the surface soil, following heavy watering or rains may become water-logged. This restricts the soil supply of air and interferes with normal growth. In extreme cases where surface drainage is imperfect excess water saturates the depressions and drowns the turf.

Watering Danger

The tendency is often to apply too much water in attempts to provide surfaces which will hold the ball. Where soil of proper physical condition is used during construction good turf can be maintained with less effort and expense. Incidentally grasses tend to grow coarser on heavy than on lighter soils. All things considered the best soils for greens are sandy to medium loams. These provide ample water-holding capacity, are plentifully supplied with air and move water rapidly.

In past practice manure was extensively used to modify the texture of the surface soil layer, and in rare instances thick layers were imbedded in the green, anticipating deeper root development. These layers are the source of much trouble, and uneven settling leaves irregular surfaces. During winter water stands in the depressions and winter-kill results. Worms seek and multiply in these manure layers and are hard to control. The main feeding roots of turf grasses occupy the surface soil and are not benefited by plant food imbedded in the green. While less manure is required to affect soil modification than sand, there are several factors which must be considered in connection with its use. Unless thoroughly rotted and composted large numbers of troublesome weeds may be introduced. When large amounts of manure are used worms become more numerous, and the abundant plant food, particularly nitrogen, encourages coarser growth of the bent wherever possible. Manure should be dispensed with and sand or other suitable material substituted, applying the plant food requirements in other forms so as to control the character of growth.

The large amount of sand required to effectively modify heavy soil, and the relatively small quantity of clay required to change a sand is rarely appreciated. A sand contains 20 per cent or less of the

fine clay particles, whereas a clay soil is any containing 30 per cent or more clay, the balance may be sand. This addition if only 10 per cent clay may convert a sand into a clay soil. Hence relatively large amounts of sand should be used with clay soils, and only small quantities of clay suffice for sands.

Fine grained sands are not suitable for modifying soil texture. The coarser sands are to be preferred and can be depended upon to materially lighten heavy soils if sufficient quantities are used. So far as possible select sands free of lime carbonate, otherwise clover control may be difficult because it thrives in soil abundantly supplied with lime.

Avoid Blue Clays

Soils bordering streams are often underlaid with a bluish gray, heavy clay subsoil, usually stained with brown concretions. The bluish color is an indication of poor drainage. These subsoils are so compact that they are impervious to water and hence unsuitable for use even in the base of the green. Clubs will be amply repaid for the slight additional cost occasioned by hauling suitable soil from adjacent higher land.

Thorough drainage is fundamental and best provided during construction. Most golfers think of drainage in terms of playing conditions, realizing earlier play is possible in the spring, later play in the fall and following heavy downpours of rain if provision is made for rapid removal of water. Drainage should be considered primarily in relation to turf maintenance and the other benefits will follow naturally.

In the spring, turf grasses in common with all plant life begins growth first on well drained soils. Excess moisture prevents soils from attaining temperatures at which growth commences. Sandy soils are commonly referred to as early soils. They are sufficiently porous to permit excess water to pass down through them. As the season advances turf or areas saturated with water rarely makes satisfactory growth and may even succumb, because the roots fail to obtain needed oxygen.

One club has re-seeded two fairways every spring for years. In this way a fair growth of turf was maintained during the summer only to disappear in the late fall and winter. Poor soil rather than drainage was blamed because a large ditch and haphazard lines of tile had been installed. These fairways run parallel and adjacent

to two steep slopes. During the late fall and early spring, seepage water oozes out from the hill sides and effectively kills the grass.

Permanent turf cannot be maintained until lines of tile are installed above the fairway and along the slope to cut the lines of seepage. Had the condition been recognized not only would money have been saved but better fairways and a more contented membership would have been the result.

Both surface and under drainage of greens are important. Surface drainage especially so on the heavier soils where movement of excess water down through the soil is slow at best. Sandy soils being more porous permit more rapid movement and hence failure to provide for surface drainage is not usually so disastrous. When contours permit, excess water moves off much more rapidly than it passes down through the soil. By providing good surface drainage severe winter damage is frequently avoided. During mild spells when the deeper soil layer is still frozen, surface water formed as a result of melting snow or from falling rain cannot pass down through the frozen soil and is a source of grave danger.

Drainage Requirements

More attention is being given to tile drainage of fairways, and the benefits of employing competent drainage engineers to design the system is being realized. The depth and distance between lines depends upon the kind of soil. Lines must be placed closer on heavy than light soils. Shallow tile are a menace, subject to shattering from alternate freezing and thawing, and do not receive water from great distances laterally.

When greens are located near slopes look out for seepage water and if present cut it off above the green, for lines of tile in the green rarely effectively receive the water.

Tile should be placed deep enough to effectively cut the seepage and obviously should run at right angles to the direction of flow. It is advisable to back-fill with pea gravel or other similar material.

If greens are to be planted with bent stolons select one of the better strains. These strains produce finer turf, grow more erect, are more resistant to brown patch, and are not so prone to grow coarse when fertilized. Undoubtedly much of the present criticism of bent stolon greens is traceable either to the use of poor strains

or improper care. After greens are once put into play they are difficult to change. This not only involves considerable expense, but puts the greens temporarily out of play.

Stolon Handling

The various stolon nurseries supervise planting or supply detailed instructions, but these are some points often overlooked. Obviously planting should be sufficiently thick to permit rapid closing. Stolons not more than a year old are most vigorous. Every effort should be made to plant stolons just as soon as received. They are usually shipped in burlap bags, chopped and ready for planting. If permitted to stand in the bags heating takes place and the vitality of the stolons is lowered. Should rainy weather prevent immediate planting, stolons should be stored in a cool place and if possible spread out in thin layers to prevent heating.

The amount and kind of fertilizer to use on greens depends upon the character of the soil. Some acid phosphate often encourages root development and can be safely applied at rates of 5 to 10 pounds per 1000 square feet. It is best applied prior to planting and then raked out the surface soil. Initial applications of nitrogen should be moderate so as not to encourage too coarse growth. If sulphate of ammonia is used it is best applied a week to ten days in advance of planting to reduce the danger of injury.

Until a root system is established the surface soil must be kept moist. This may involve sprinkling twice a day. If the soil is dry at the time of planting, more water may be required at the first sprinkling because dry soil absorbs water slowly.

Many bent greens are ruined during the first couple of months. They must be cut closely from the start. Inexperienced greenkeepers permit the bent to grow unhampered expecting the bare areas to close in more rapidly. Long runners develop, grain and nap appear, and the turf becomes tufted.

Fertilizing

Early and persistent cutting is essential to the development of erect turf. Clippings should be allowed to fall, and the greens should be top-dressed frequently. Nitrogenous fertilizers should be applied, the amount and frequency of application depending upon the color of the turf, character and rapidity of growth.

Seeded greens usually require more gen-

erous fertilization than those planted with stolons. Grass seed contains so much less stored food than stolons that mineral plant food elements must be obtained from the soil immediately growth begins. Abundant phosphoric acid is particularly important to stimulate root development and insure a uniform stand. Not less than 10 pounds acid phosphate should be applied per 1000 feet of surface and worked into the soil prior to seeding. Some nitrogen should be applied also, about 3 to 5 pounds per 1000 square feet if from sulphate of ammonia and 30 to 40 pounds if one of the better organic nitrogen fertilizers are used. Too much soluble fertilizer must be avoided to prevent injury to the sensitive young seedling. The danger is lessened by making applications somewhat in advance of seeding.

Failure or sparse turf are altogether too common on new fairway seedings and are often traceable to insufficient plant food. Once obtained, thin turf is difficult to improve especially on heavy soils.

Last fall a new club, with a considerable farmer membership ignored what later proved to be sound advice, and seeded fairways without fertilization. This spring these fairways were entirely devoid of turf. The short sparse grass which developed last fall succumbed during the severe winter. This spring before reseeding landing areas and approaches were treated with generous amounts of acid phosphate and moderate amounts of nitrogen. Six weeks later when the sparse grass on the unfertilized areas was one half inch high, the fertilized areas carried dense grass at least two inches high. Had the fairways been fertilized last fall, seed and soil preparation would have been saved this spring and play would have been possible early this year.

Manure is not always essential particularly on soils of good physical condition, namely sandy loams, loams, and silt loams. On heavier soils generous applications disced into the surface produces marked improvement of physical condition. If time permits this same effect can be obtained by growing a green manure crop. One of the legumes, cow-peas, soy beans, sweet clover, etc., should be used because they draw upon atmospheric nitrogen and thus enhance the soil supply. Legumes are heavy phosphorus and potassium feeders, and should be fertilized with a fertilizer containing these ingredients. Nitrogen is not necessary.

As already mentioned phosphorus stimulates root development and hence is most important. A dependable chemical method for determining available phosphorus in the soil has been devised recently and serves as an excellent guide in recommending phosphorus needs. Since phosphorus exerts such marked effects on root development maximum benefits are only obtained when applied in available form, and worked into the soil prior to seeding. Applications of 250 to 350 pounds of acid phosphate usually suffice, but when the soil contains only small amounts of available phosphorus 500 to 600 pounds may prove more effective.

While nitrogen can be supplied later, some should also be used at the time of seeding. The amount depends upon the type of soil and fertilizer material used. Soluble fertilizers must be used sparingly to avoid injuring whereas organics such as cottonseed meal, poultry manure, milorganite, etc., can be applied in amounts ranging from 750 to 2,000 pounds. Sandy soils may need some potash which is best supplied from muriate of potash, usually 100 to 200 pounds per acre suffice. Since this material is water soluble large applications must be avoided or damage may result.

Plant Food Failures

Failures resulting from the substitution of concentrated plant food materials have often been due to one or both of two causes. Selection of improperly balanced fertilizers or too small applications. A twenty-ton application of manure supplies 150 to 200 pounds nitrogen, and 75 to 100 pounds phosphoric acid. How can several hundred pounds of commercial fertilizer be expected to produce equally good results?

Low Cost Leads Astray

To sum up the success of a new course from a turf standpoint depends primarily upon proper soil conditions, including adequate drainage, good physical condition, and ample plant food. Then, if high grade seed is correctly sowed in a good seed bed, a fair break in weather will insure good turf on greens and fairways. Construction committees should stress these points rather than low cost figures. The slightly larger expenditures will be more than offset by lower initial maintenance costs and a more contented membership.

"Meet the Wife"

How "Silent Partners" Are Helping Their Pro Husbands

By HERB GRAFFIS

ONE who prowls around the country in search of editorial material concerning the business management of golf cannot help but be impressed with the important parts in shop operations that are played behind the scenes by the wives of the professionals.

Without any wise-cracking about it, the "silent partners" of some of the most successful pros are their wives. I saw in *The American Golfer* some months ago, a tribute paid to Mrs. Al Espinosa as the business manager of Al's active tramping campaign during the winter season. All Al has to do is play golf. Mrs. Espinosa takes care of the business details and she does a great job of it, too. Quiet, thorough, efficient; that's Mrs. Espinosa, so it's no wonder that Al has the fine barnstorming record he enjoys.

But on the shop end there are a flock of unsung heroines, and of one of them we'll tell in this yarn. The club members frequently never see the pro's wife, but the manufacturers' representatives very often are aware of the business-like participation of The Lady in the conduct of the pro's merchandising operations. It has been my observation that many of these women are first class "managers." It may be a matter of feminine temperament, time available, or the lack of distractions. I don't know which; but it is certain that when a pro's wife realizes what he is up against in conducting his business, and helps him out with ability and discretion, things go better for the pro.

Some of the fellows who are making the territory for the manufacturers have called my attention to the feminine influence in making the pro shop an inviting business establishment. Others have commented on various other phases of professional business operations wherein the pros' wives have conducted themselves as exceedingly able merchandisers. From these tips I got a lead that Elmer Biggs, pro at the Country Club of Peoria (Ill.) was one of the pros whose wife was a sure



Elmer Biggs and the Partner for "Better or Worse."

enough team-mate. Mrs. Biggs plays an important part in the Biggs family act, even though her part is played behind the scenes.

Now here are some of the ideas on shop business management that Mrs. Biggs has. They will interest a lot of pros and their wives.

"The golf shop is a place of business and I can see no reason why there shouldn't be system in it as there is in any other business," begins Mrs. Biggs.

She calls attention to the fact that "retail stores of all kinds require the assistance of bookkeepers and stenographers and that sort of clerical help the pro's wife can supply in his operations."

When you talk to Mrs. Biggs or Mrs. Dave Clarkson or any other of the wives