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A MONTHLY PERIODICAL TO PROMOTE THE BETTERMENT OF GOLF COURSES

ISSUED BY THE GREEN COMMITTEE OF THE UNITED STATES GOLF ASSOCIATION

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Green-Keeping Problems of Course Planning

There is a phase of golf-course planning which is so frequently overlooked that it may not be inappropriate to make it the subject of a brief article. We refer to the imperative necessity of keeping maintenance problems in mind in connection with the layout or plan of a course.

Too frequently we find a course on which a practically impossible problem in green-keeping is presented at some hole or green, which might have been obviated by giving more consideration to the subject when the course was laid out. We have in mind one course on which there are a number of draws or flat-bottomed ravines running east and west with ridges between them. The soil is extremely light and, as might be expected, years and years of washing rains have impoverished the ridges and enriched the draws. These draws are wide enough to make ideal fairways, and the ridges on the sides, with their very uneven lines, would provide beautiful rough and just the proper hazards to penalize an off-line shot. The draws instead of running in exactly straight lines east and west, twist and turn more or less, so that if fairways were placed in the draws they would call for placed shots and have just the irregularity of outline required to make desirable fairways. Instead of utilizing these draws for his holes and fairways, the architect deliberately ran his holes north and south *across the draws and ridges,* thus filling the course with blind shots, injecting the impoverished sand-ridges in the fairways, and forcing the location of greens and approaches on ridges. Instead of planning a course which could be constructed and maintained at a minimum cost, the architect created an impossible condition which can never be satisfactorily solved and which can only be put into tolerable condition by shocking outlays for construction and maintenance. Instead of providing fairways that would require little or no fertilization, he has provided some that will always be half good and half bad, and the bad half will always require exacting and expensive care.

We do not pretend to suggest that a better course architecturally could have been laid out along instead of across the draws; perhaps on paper and in theory it would not have been so good; but it is clear that had any practical green-keeper been consulted he would have immediately pointed out the impossibility of constructing and maintaining the course as laid out. There may have been some reasons for the layout, but none can be suggested that appeal to us as convincing. Perhaps the land had been bought and the architect was limited to that piece and could go no farther. If so, the man who bought the land without consulting both an architect and a green-keeper made the mistake. The cost of a little additional land would have been saved annually in expense of upkeep. A fee paid to a high-class green-keeper would have saved thousands and thousands of dollars.

How often we find greens placed in some smothering, ill-drained, ill-ventilated place in naturally toxic soil where the Lord himself would not attempt to grow grass! Such a green may be most attractive from the architect's and players' views; but how they both curse the green-keeper for his inability to grow grass! How the architect roars when the beautiful lines and features of the child of his brain are splotched with fungi

and blights! How unforgiving the player is when his putts slither off a greasy, slimy green! The poor greenkeeper, who has no voice in the lay-out, must live for years with an impossible condition; and good money must be spent year after year to keep in indifferent shape greens that might have been perfect if better located.

Boiled down, the point of this article is that the green-keeper, who must live with the course for years, should be consulted in its layout; and the architect should compromise his ideals for the practical; and, first and above all, neither the architect nor the green-keeper should be so strictly and rigidly limited as to available land as to compel them to do things they both know will be a source of dissatisfaction and expense for years.

Another point is, that money spent in advance in consulting one or more good green-keepers is quite as well spent as that paid to the architect. The better architects endeavor to be practical, but we know of none who would object to the helpful suggestions of a practical green-keeper or who would not modify plans to obviate a proper criticism.

What to do when such mistakes are made is another question; and it is believed, in most cases, that the cheapest and best way out will be to abandon the thing that is impracticable from a green-keeping point and start over, having the architect and green-keeper work out some compromise that will fairly well satisfy both. For instance, in the case of the course first mentioned, it would be clearly cheaper to abandon the course, call in the architect, and turn it around and place it where it can be maintained at a reasonable expense. It takes more courage to correct a mistake than to suffer with it for years; but nine times out of ten, immediate and courageous correction is the cheapest means.

District Green Sections

The Green Committee of the U. S. Golf Association feels that no more important step can be taken in furtherance of its purposes than the organization of district green sections in every center or city having three or more courses. No particular form of organization is required, but it is suggested that every club should be represented by the chairman of its greens, and such representatives should comprise the section. The actual management and conduct of the section should be taken charge of by a small committee, which may be known as the green committee of the district, and of course there should be a chairman and a secretary.

The district green committee through its officers should see to it that every club in the district is affiliated and that each one becomes a member of the Green Section of the U. S. Golf Association. Whenever any information of benefit to the clubs comes to the attention of any one it should be brought to the attention of the officers and communicated to the members. A meeting should be held say once a month on one of the courses in the district and it should be made the *duty* of every green-keeper to attend. It goes without saying that each club should be represented at every meeting by the chairman of its greens, by its green-keeper, and by such members of the green committee as find it possible to attend. The important consideration is to get together once a month. A green-keeper can serve his club and himself in no better way than by attending these meetings.

Attendance by green-keepers should be made a part of their jobs. The clubs should take turns in inviting the members of the section and green-keepers so that one at a time the courses will be looked over. Good, bad, or indifferent as its course may be, each club should show what it has and explain everything to its guests of the day. It will be found that the green-keepers and members will break up into little groups as they walk about the course and that men will move from one group to another talking over the points or conditions. The chairman of the club under inspection and the green-keeper should act as masters of ceremonies and conduct the party around the course or from point to point, showing and explaining every thing that may be of interest, from the method of construction to the manner of cutting grass. It will be well to have the employees show exactly how they do different items of work, such as top-dressing, applying fertilizers, weeding, and the like; not that there may be anything novel, but to bring out suggestions and criticisms. For instance, at one such meeting rather coarse top-dressing was being applied and was then brushed off the green with the back of a rake, leaving more or less coarse stuff on the turf. A very lively discussion was developed as to the condition top-dressing should be in when applied, how it should be brushed or worked in, what tools should be used, how often it should be applied, and so on through the whole range of the subject. Mere top-dressing looks simple; but it started a discussion that was interesting and which could not be completed in many a day.

These meetings will provide the means of personal contact between green-keepers and the chairmen, and also between the Green Committee of the U. S. Golf Association, which is anxious to enjoy the active assistance and cooperation of practical green-keepers.

Every green-keeper will find it to his personal advantage to attend these meetings, as they will enlarge his field of acquaintance, bring him useful information, and perhaps increase his usefulness and earning power. The best men in such a gathering are easily picked out and the "know-it-alls" and "wind-bags" are soon left to herd by themselves. In the Detroit Section the meeting was started with a light luncheon, which enabled the men to be assembled for such preliminary talk as was necessary to explain what was to be done later.

There is no end to the good that may come out of the organization of these district sections, and there are a variety of ways by which the interchange of ideas and information can be brought about; and it is certain that if by meetings, bulletins, and otherwise the members of green committee and green-keepers get together or are put in touch with each other, costly mistakes will be avoided and there will come a better understanding of the work of green-keeping and all its difficulties and problems, and the work which the Green Committee of the U. S. Golf Association is trying to do will take practical and effective form.

The Turfnut

Every country club should have a turfnut. No use to look in the implement and seed catalogues—it is not listed. A turfnut is made in the image of a man. From the standpoint of the golfer he is a superman. Some things are above price. A genuine turfnut belongs in that class. He cannot be hired or fired. He may be ignored for a season, ridiculed for several seasons, but he cannot be suppressed. In the end he will leave an impression on his course.

Several golf clubs are the fortunate possessors of turfnuts. "Richland Center" has one. It is not necessary to prove that "Chauncey" is a turfnut. He frankly admits it. Chauncey is also contributing to the shortage of white paper, and thus increasing the cost of printing THE BULLETIN, in a futile attempt to make a turfnut out of his friend "Bill." It can't be done. Bill just hasn't got it in him. If he had he would ere this be giving instructions to Friend Chauncey instead of still earnestly seeking knowledge by soliciting advice from "experts" *et al.*

This leads up to the matter of qualifications for a turfnut. The candidate for this inspired and enchanted fraternity should have much leisure. To put it in plain English, he should not be hitched with too short a rope, either by business or family cares. It goes without saying that he loves or did love the game dearly. Sometime in his career he should have made one of the eighteen holes in below par. This will give him a point of contact with the other players. He will be able to speak their language; and convincing the "powers that be" in control of the funds with talk is one of the hazards of the game. But above all other qualifications the turfnut must possess an inquisitive, experimental frame of mind—not the inquisitive mind that questions every so-called expert that blows in to save the club from the trouble of investing its surplus funds, but the kind of mind that seeks facts by trying things so as to learn what really does happen. With every golf course there are scores of problems that are peculiar to that course alone. The Green Committee of the United States Golf Association, with all of its profound wisdom, can hope to solve but a small fraction of these. Neither can the green-keeper be expected to spend much of his time in experimenting. He is too busy. This then is the part to be played by the turfnut. When strange bugs begin nocturnal grazing on the greens, when disease overtakes the grass, when faulty drainage causes puffs and spewing in the winter, when ill-designed and poorly constructed machinery is disfiguring the course, the turfnut puts his individual attention to the problem, locates the trouble, and improvises a remedy. He is ever alert to improvements in culture of fine turf. His motto is, "try everything at least once." If there is a bog of muck convenient to the club, he puts some of it in a box and finds out if it is toxic or not to grass seedlings. If he is not satisfied with the customary methods of seeding, he tries out methods of his own devising. The same with watering, top-dressing, mowing, and the many other details of golf-course management. The late Frederick Taylor was a turfnut extraordinary.

Each club must develop its own turfnut from among its members. Usually it means the spoiling of a good player. When the right individual is found he should be given every encouragement. He should be on the

green committee, preferably its chairman. But if he is an honest-to--goodness turfnut he will be the whole committee whether he is on it or not.

Estimating the worth of a turfnut to a golf club is like putting a dollar sign on sunshine and summer showers. But go to any golf course which possesses outstanding merit and you will find somewhere around the grounds its turfnut, for it will surely have one, busily engaged in studying the troubles of the day. The turfnut fills a place not covered by experts, architects, greenkeepers, or confidential advisers. Through him more than through all of these has real progress been made in the technique of growing fine turf. It was he who invented the slogan "replace divots."

The Control of White Grubs on Golf Links

W. R. WALTON

The turf of golf links, both on the fairways and the greens, frequently is attacked and sometimes severely injured by white grubs. These voracious insects devour the roots and underground stems of the grasses, cutting them completely off and causing the grass to dry up and die in patches which may be of small size, but which occasionally aggregate acres in extent.

Golf links which include deciduous woodlands are most liable to attack, because the May beetles, which are the parents of the grubs, are attracted to and feed upon the foliage of such trees, afterwards laying their eggs in the sodlands contiguous to these trees. May beetles, which are strictly nightflying insects, feed principally upon the oak, hickory, poplar, elm, willow, locust, hackberry, ash and walnut, although a few species are known to be attracted to conifers. Practically all of the most injurious species of white grubs spend two full summers feeding beneath the surface of the soil, and the complete life cycle consumes three years. In the most northerly states the life cycle may be as long as four years, or be reduced to as little as two years in the extreme south.

The eggs of the May beetle are deposited in the soil usually on rising ground. They hatch some three or four weeks later and the young white grubs feed during the first season on decaying and living vegetation in the soil. The injuries caused by these at this time are comparatively slight and often escape notice. In the fall white grubs penetrate deeply into the ground and remain inactive until the following spring when they once more approach the surface and begin to feed in earnest on living vegetation. From May to September or October of this second year is the period during which the grubs do their greatest injury to grasslands. At this time they are comparatively close to the surface of the soil and easily may be reached by insecticidal treatments of the character hereinafter described. During the colder months of the year, from October to the following May, the grubs are inaccessible to exterminative measures, and it will be a waste of labor to attempt to eradicate them at that season. A possible exception to this rule may be found in the extreme southern states where the white grubs have been but little studied and are less troublesome than in the north.

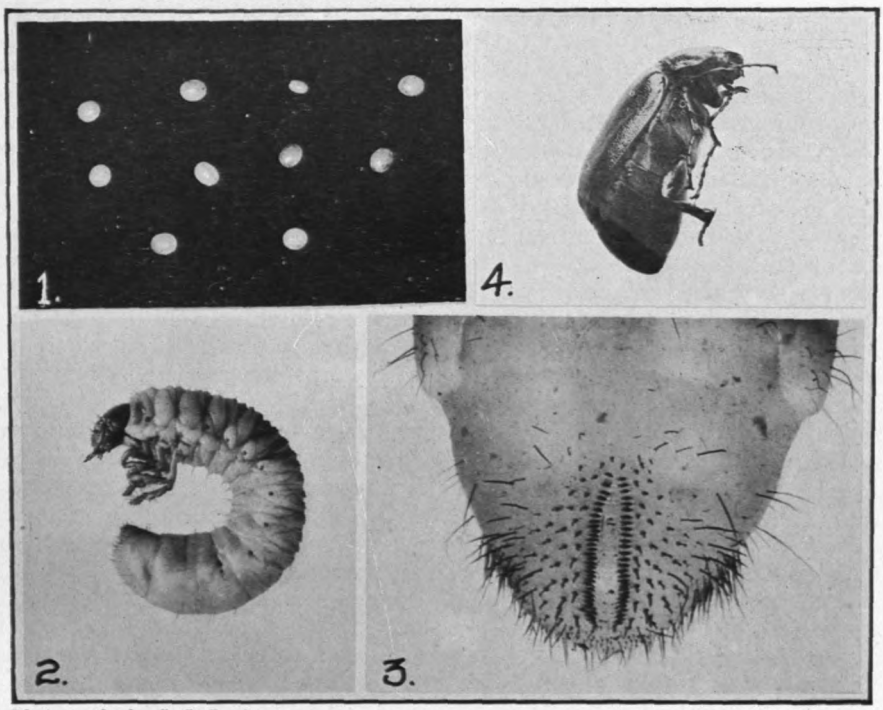
Control Measures

Since golf links consist for the most part of lands that are permanently in grass, the ordinary beneficial cultural practices of the farm, such as rotation of crops, are impracticable as methods of control. It becomes necessary, therefore, to resort to the application of insecticides to destroy the insect in either the grub or adult stage.

Spraying the food trees of the adult beetles with arsenate of lead, two pounds to fifty gallons of water, is effective but requires the employment of a high-power spraying apparatus, fitted with the Worthley solid-stream nozzle. The purchase of such machinery in most cases will not be found advisable because of the expense involved, but in some locations arrangements might be made with commercial spraying concerns or municipal authorities to undertake the work at a cost that need not prove prohibitive.

Collecting beetles from their food trees by jarring such trees while the beetles are feeding at night, having first spread cloth sheets under the trees to catch the fallen beetles, has been practiced in Europe and might be found of service in this country under some conditions.

Experiments conducted recently by Mr. R. H. Van Zwaluwenburg, of the Bureau of Entomology, U. S. Department of Agriculture, on the links of the Merion Cricket Club in Philadelphia, have shown that the grubs may be very efficiently controlled, with apparently complete safety to the



Photographs by J. J. Davis.

Fig. 1. Eggs of a May beetle; they grow after being laid. The small one in top row is freshly laid. Fig. 2. A full grown white grub. (Photo about twice natural size.) Fig. 3. Under side of the tail of a white grub, showing double row of heavy spines. Most harmless grubs lack these spines. Fig. 4. Side view of a May beetle, the parent of the white grub.

grass, by the application of a solution of cyanide of soda (sodium cyanide). This extremely poisonous chemical was applied in a solution of 160 pounds of sodium cyanide to 12,000 gallons of water. The amount named is ample for about one acre. This formula was adapted from the work of Mr. J. J. Davis as used for the destruction of the Japanese beetle, a related species which is being combated in New Jersey under the direction of Dr. A. L. Quaintance, of the Federal Bureau of Entomology.

In the case of comparatively small areas where it is desired to prepare lesser amounts of the solution, Mr. Van Zwaluwenburg has suggested the following: sodium cyanide, 10½ ounces; water, 50 gallons. Apply one quart of the solution per square foot of infested grassland with an ordinary hand sprinkler. Where it becomes necessary to treat extensive areas the use of a 600-gallon tank sprinkler, fitted with a 3-inch pipe 7½ feet long, running across the back of the tank, is advised. The sprinkler pipe should be pierced with three rows of ⅜-inch holes, 12 to the row, or 48 to the foot. With this equipment the proper dosage may be applied by driving the sprinkling apparatus at a walking pace, or about 4 miles per hour.

Among the other insecticides tried by Mr. Van Zwaluwenburg were carbon disulphide, sodium fluoride, and kerosene-fusel-oil soap emulsion. The carbon disulphide was effective when injjected into the soil at the rate of from 1 to 2 ounces per square foot, but burned the grass severely around the points of injection. Sodium fluoride, dusted on the surface at the rate of 1 ounce per square foot, was ineffective and killed the grass. The kerosene-fusel-oil soap emulsion gave variable results of from 1½ to 69 per cent kill and was safe even at 10 per cent strength when watered immediately after treatment. In no case, however, did it approach the effectiveness of the sodium cyanide applied as formerly described.

There is one thing regarding the use of sodium cyanide which can not be too strongly impressed upon the minds of those who expect to use this chemical, namely: that it is one of the most *powerful and deadly poisons known to man* and must be handled with corresponding care and discretion. Prof. J. J. Davis is authority for the statement that when applied as described at the rate of 165 pounds per acre, it disappears from the soil within ten days to two weeks. He also states that it sometimes burns the grass slightly where the solution stands on the surface for any length of time, although no effect of this character was noted during the Philadelphia tests. The cost of application at the Merion Club links was roughly estimated by Mr. Van Zwaluwenburg as from $75 to $90 per acre, including the labor. The cost of the cyanide alone was from $48 to $56 for one acre, estimating 160 pounds to the acre. These figures may seem rather high, but when one considers the effectiveness of the appilcation and the small areas which under ordinary circumstances would require treatment, the cost involved becomes of small importance.

Kerosene emulsion usually is effective as a means of destroying white grubs where they are very close to the surface of the soil. In case it is desired to try this method, the standard formula for its preparation is as follows:

One-half pound of hard soap or 1 quart of soft soap, preferably fish-oil, rosin-soda, or rosin-potash soap, is dissolved in 1 gallon of boiling water, and while hot 2 gallons of kerosene are added and the mixture thoroughly emulsified. This may be done most easily and thoroughly by churning for

about 10 minutes with a spray pump, the nozzle being turned back into the liquid. When thoroughly emulsified the preparation will have the consistency of thick cream, and the oil will not separate. Danger of injuring plants is great if the mixture is not well and thoroughly made. For a 7½ per cent emulsion add 25 gallons of water to the above stock solution and mix thoroughly. It is desirable to use soft water both for the stock and for diluting, but where this is not obtainable the water should be softened by adding lye or sal-soda. A much better emulsion, apparently more effective and more easily made, is prepared by the use of fusel-oil. It is prepared by dissolving 3½ pounds of fish-oil soap in enough water to make a gallon, adding 1 quart of fusel-oil and then 2 gallons of kerosene. When this is churned thoroughly and emulsified, add 25 gallons of water, to make approximately a 7½ per cent emulsion. After application the emulsion should be washed into the soil by sprinkling copiously with water. Water washes the emulsion from the grass and prevents burning and at the same time permits the insecticide to penetrate more thoroughly into the soil. For small areas an ordinary sprinkling can may be used in applying the emulsion, but for larger areas the use of a force pump will save time and labor, a wide sprinkling-can type of nozzle or "rose" being used, so that the lawn can be uniformly drenched in the shortest possible time.

The Lawn-Mower and Its Care

N. D. PERINE

Much has been written about golf-course construction by well-known architects and engineers telling how deep the subsoil should be and how much top-soil, top-dressing, fertilizer, and humus should be used. The grass expert has written of the kinds of seeds that are best adapted to the various requirements of the course. But very little has ever been told about the tool that is most important and without which the links would be impossible—namely, the lawn-mower.

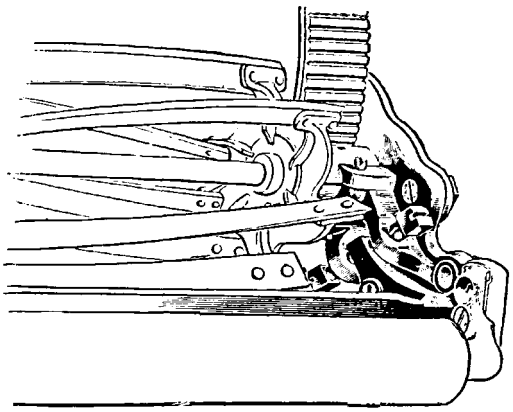
There are many styles and kinds of lawn-mowers, and, like grass seed, certain varieties are best suited for the greens, certain kinds for the fairways, and others for the tees, approaches, and rough. Different manufacturers employ unlike methods of construction, and various styles made in the same factory are built differently; therefore it is difficult to give any suggestion as to the care of mowers to secure the best results at a minimum cost, except in a general way.

The mower best suited for most greens is of the type that has the seven knives and ball-bearings and can be set to cut as closely as 3/16 inch. This is the general type used on probably two-thirds of the golf courses in this country and on many in England and Scotland.

All mowers when they leave the factory should be properly adjusted for cutting, making it necessary only for the ground-man to attach the handle and to *oil all bearings*. It should always be borne in mind that a lawn-mower is a machine, and like all other machines it requires oil and attention. Do not use a heavy-engine or automobile oil that will gum, but a medium-light household oil, and use it frequently, for it does not last long when the machine is run in the hot sun. Should the bearings become gummed by the use of inferior or heavy oil, pour kerosene into them. It

is well to give the man pushing the mower an oil can, but never a screw-driver or a wrench, unless he knows how to use it. The ground-keeper himself or a man with some mechanical ability should look after the adjustments of all mowers and be responsible for their upkeep.

It is an easy matter to adjust the blades if one knows how. Constant use gradually wears the blades, and they must be adjusted or brought more closely together to take up the wear. The blades should be set so that they are true with the bottom knife and then turned over and the two corresponding square-head screws underneath the machine should be tightened; these screws press against the ends of the knife-bar and bring the knife edge closer to the cylinder. When set, the cylinder will revolve freely without binding. The machine should cut a piece of ordinary newspaper cleanly and without tearing. Do not attempt to tighten the one set of screws before the others are loosened, as this is liable to break the side casting, but whenever one screw is loosened the corresponding screw on either the upper or lower side must be tightened to the same extent. Do not use too much pressure with a wrench on the square-head screws, as this is also liable to snap off the castings.



If kept properly adjusted, it should not be necessary to grind the blades during the season. Provision is made on certain well-known machines for a crank to be screwed into the left end of the cylinder shaft to turn the cylinder backwards. In conditioning a machine the lower blade should be set close, to bind the cylinder slightly. Then a paste of emery powder (about No. 120) and machine-oil should be spread rather freely on the lower knife before revolving the cylinder backwards. A few minutes only of this operation should suffice to sharpen the blades, after which the paste should be wiped off and the blades adjusted for cutting. Never attempt to sharpen the blades of a lawn-mower with a file, as it simply can not be done. The proper way is to bevel-grind them on a stone, under a jet of cold water, and then "top" them on an emery wheel, which gives them a lasting edge.*

The ball-bearings have their own special adjustments. It is a very simple operation to adjust them. The adjusting screws for the blades and cones have nothing to do with regulating the height of the cut. The roller back of the knives does this. Loosening the bolts holding the roller brack-

* There are at least two good grinders made for shop use, and to those interested the names and addresses of the makers will be given upon application.—EDITORS.

ets and then raising the brackets, with the roller, permits the mower to cut more closely, while lowering the roller increases the height of the cut.

After making an adjustment of any kind be sure to tighten the bolts or screws. In fact, all bolts and screws should be looked after occasionally to see that they are kept tight.

There is a type of putting-green mower which is quite popular with some greenkeepers, known as the roller-mower. The driving mechanism is in the two iron rollers, or drums, back of the knives, as in the ordinary horse-mower, and the front is supported by two caster wheels and a wooden roller. These are adjustable for the height of cut. In this mower the adjustment of the blades is different, as the lower knife is bolted rigidly to the frame while the revolving cylinder rests on floating bearings or on pivots, and the entire housing is regulated by a cap-screw which moves the bearings up and down. The roller-mower is generally preferred on a green that is sharply undulating, as there is less likelihood of clipping into the mounds.

A direction-sheet with illustrations explaining in detail the methods of adjustment together with a list of the various parts with factory numbers should be packed in the box with every mower and should be preserved carefully for future reference.

Care should be taken to order repair parts accurately, and by factory number where possible. It means quicker service, and frequently it avoids correspondence and consequently loss of time. The parts are right side, or left side, as you push the mower.

At the end of the season the mower should not be put aside until the next spring but it should be sent to the factory for a general overhauling provided the club is not equipped with a grinder or other facilities for doing such work.

If the club has the equipment, the repair work should be done at once, or at least the repair parts should be ordered at once instead of waiting until the grass is about ready to be cut the following year. In the early spring all lawn-mower factories are usually rushed with work of all kinds, and there is the possibility of delay in shipment at that time. It entails no more effort on the part of the greenkeeper to send his mowers to the factory or order his repairs in the fall, and it might save him and the committee many an anxious moment in waiting for them when the grass is growing in the spring. New equipment, for the same reasons, should also be ordered early instead of holding off until time to use it. Lawn-mower prices are always made in the early fall for the following season; so nothing is to be gained by delaying the purchase. It is advisable, especially if the factory is some distance away, to have on hand a small supply of extra parts in case of a breakdown in midseason. Such parts as extra gears, pawls, lower blades, and set-screws do not involve a heavy investment, and they are mighty handy to have around when needed.

Some clubs utilize the old greens mowers for cutting the tees and approaches. This is all right if the laborers do not object. The greens mowers are constructed for close cutting, with seven blades in the cylinder, and when put to any other use they push much harder than the four or five-knife mowers for mowing the ordinary lawn. The grass is permitted to grow as long on the tees as on the well-kept lawn, and as it need not be cut as smoothly as on the putting-green the five-knife mower is preferable since it is easier to push. It is poor economy to try to save a few

dollars on the purchase price of a lawn-mower, whether for the greens, tees, or fairways, but real economy to buy the best that is made.

Until a few years ago the fairways were cut with the ordinary horse-drawn lawn-mower, with a cutting width of 38 or 40 inches, and the rough was cut with the field mower. The heavy motor mower was tried and discarded because it was thought that its weight was injurious to the turf and also because of its complicated mechanism and cost of operation and upkeep. The up-to-date fairway mower, likewise the most economical, is the threesome, pulled by tractor or horse. This consists of three mower units, each 30-inch cut, so arranged under a frame to cut a swath of 7 feet and 2 inches in width, and is operated by one man.

The tractor is rapidly replacing the horse on the fairways. It can travel five to seven miles an hour, or twice as fast as the walking horse, and some of the manufacturers have an arrangement for hooking up five units to secure a cutting swath of 11 feet and 8 inches. The economy of this outfit is apparent, as it will cut an entire course in a fraction of the time it formerly took with the horse mower. Such a mower can also be used in the rough by adjusting the height of the cut to the desired length of grass, usually about three inches. This is done by lowering the roller brackets, which naturally raises the rear of the mower and the cut.

As the chairman of the green committee usually receives credit for the condition of the course, good or bad, so also he is responsible for the mowing equipment of the club, and his interest in such affairs should not die out with the grass when the mowers are discarded for the winter season, but on the contrary he should take account of stock, have old mowers sent to the factory or shop for repair, and place orders for new equipment needed the following spring.

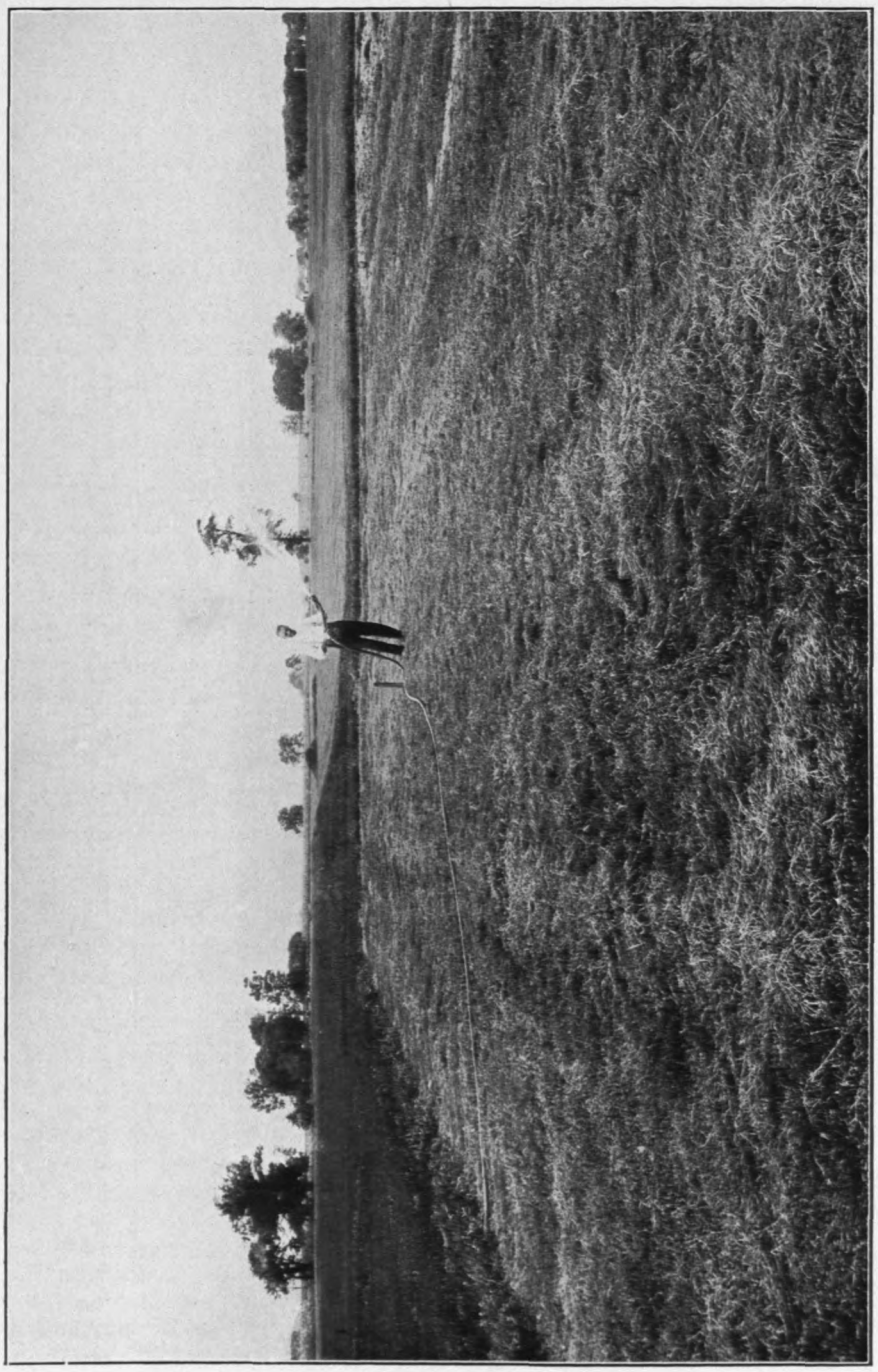
Golf is deservedly growing in popularity in this country and is consuming a vast amount of material, among which are lawn-mowers. In former years the special golf mower was a side line with the factory, but now it is a main line, and it will probably surprise some readers to learn that many thousands of the popular brand of greens mowers are annually exported to Great Britain, where the game originated.

Removal of Grass Cuttings

Nothing is quite so nasty near an otherwise perfect green as the usual pile of grass clippings. They become rotten and malodorous, and while we sympathize with the poor golfer who steps into the slimy mess, we think the greenkeeper deserves criticism. Incidentally such grass heaps are breeding places for many insects. Why not require clippings from greens to be emptied in burlap sacks which can be hauled away to use in a compost pile? This involves very little extra labor and is worth while in every way.

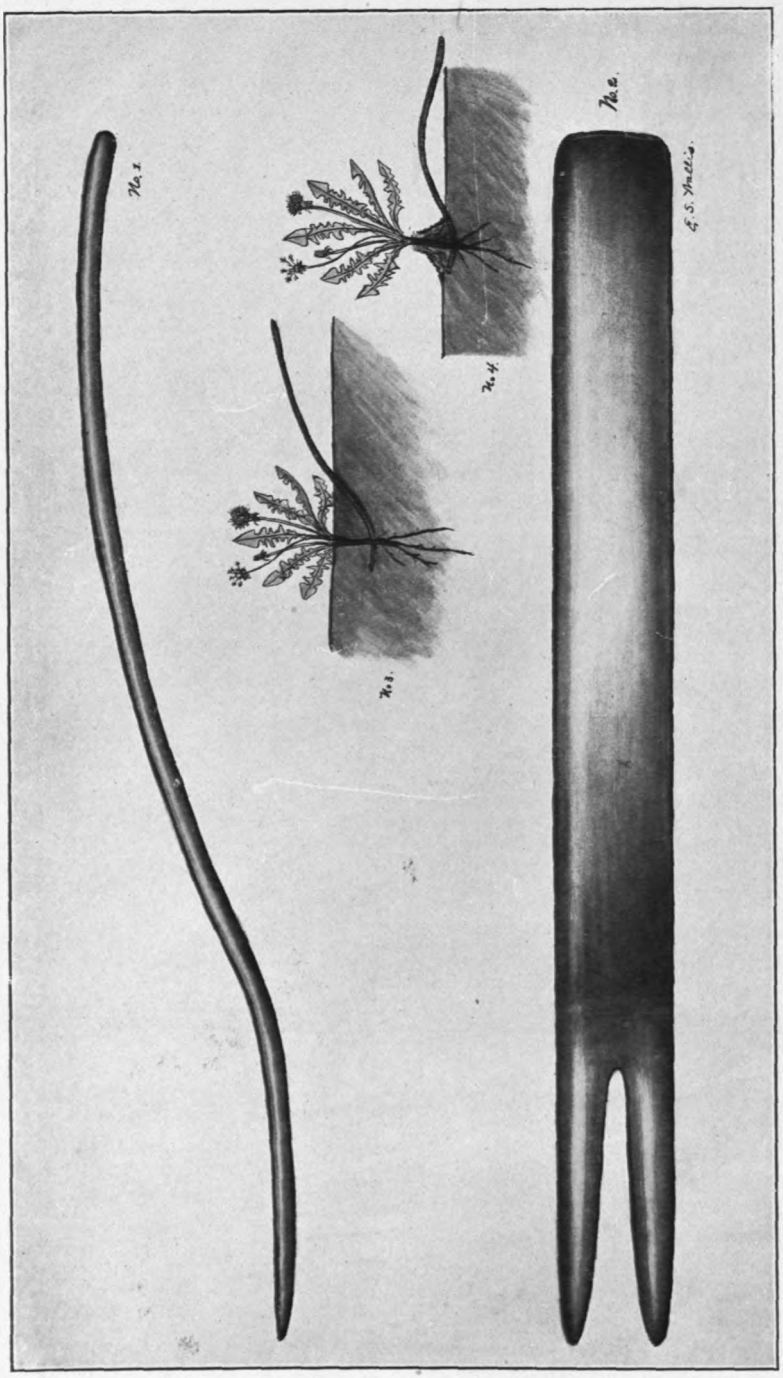
Dependable Reports from Seed Houses

The Committee notes with approval the growing tendency of seed houses to give exact facts concerning the condition, purity, and germination of seeds offered for sale. We are in receipt of one letter from a seed house which sets forth the facts respecting its seeds with commendable frankness, and we believe the time is not far distant when all seed houses will realize that it is to their advantage to inform customers fully and candidly.



A FINE CREEPING-BENT NURSERY

Creeping bent in the turf nursery of the Moorestown Field Club, near Camden, N. J., grown under the direction of Judge E. B. Leaming. The bent runners were planted in September, 1920, in rows 6 feet apart, and the photograph here shown was taken in August, 1921. Note that the runners have completely covered the interspaces; they doubtless would have done so had the rows been 8 feet apart.



A dandelion hand-weeder that works very satisfactorily; made of spring steel. Full size, 12 inches long by 1¼ inches wide.—George M. Mashek, Escanaba Golf Club, Escanaba, Mich.

Dear Bill Letter V

RICHLAND CENTER, N. Y., September 1, 1921.

DEAR BILL:

You certainly are in the adolescent stage of development—"addled state" would be better, because you've listened to every one who would talk to you, from the expert down. Just now you'd function quite as well if the top of your head was cut off and the contents were replaced with rice-pudding or cornbeef-hash.

You'll learn a lot quicker, Bill, if you keep on asking questions and listening to every one who will talk. But don't try all the stuff. Don't start in experimenting with this, that, or the other thing that some plausible talker says beats the world.

When you are thoroughly convinced that some scheme, system, or treatment is just the thing, go out and take a look at nature, if you can find her untampered with in your neighborhood, and then contemplate how the Lord produces really commendable results by a treatment that is simplicity itself. Listen, Bill—stop, look, and listen, if you will; but give nature a chance. The more you listen the less you'll experiment. And beware of systems. The man with a "system" of constructing putting-greens is full-blooded brother of the chap who has a system of playing roulette—they are out of the same litter. You'll go broke if you follow either. The really wonderful thing about nature is the amount of abuse it will stand and still survive. But where it is tackled with a "system" there is more than half a chance it will give up in disgust.

There's just one "system" you can safely adopt, and that is a system of asking questions. Ask them in every way and form you can think of, and don't be afraid or ashamed to ask them. The less you appear to know the more information you'll get. The system lies in asking the same question twice or three times to see if you get the same answer. It's a great system, Bill, and it has exploded many and many experts. Try it out. Ask the next expert that comes along a question about something or other, and after an hour or so ask the same thing perhaps in a little different way, and if you get the same answer give the expert one credit mark; but always keep a dozen or so questions going at the same time.

There's another thing to remember, Bill, and that is, "seeing is believing." When the expert has passed all the preliminary tests and has your committee about convinced that he should be employed and his system is the best and his goods are the only simon-pure articles to be had, instead of signing just above his thumb arrange to see some of the work he has done, and talk—don't write—to the people he has done. When he claims credit for making or putting some course in condition, find out if the men on that course are still buying stuff of the expert, and if not, why not. If your program calls for the expenditure of five, ten, or fifteen thousand dollars, you can well afford to spend a couple of hundred just looking and asking more questions.

There's just one more thing, Bill. When the expert begins to knock you may know there's something wrong. He may be getting his gas all right, but you'll find a pin or bearing loose somewhere; and when he starts claiming that scientists are all right in their way but they are not to be compared with practical men like himself, give him the air and step on it hard. When he claims credit for results that you can easily find out were largely due to the Lord and when he charges others with causing results

that were attributable to some incurable blight, reach for the bung-starter and ring for the bouncer.

Just one thing more, Bill. Before you swallow the whole dose the expert prescribed get him to give you his history, and check him up, and if he claims credit for "making" this or that course, or if he says he worked under or with this or that man, you'll probably find his recollection is a trifle too enthusiastic in his own favor.

Guess I'd talk all night about "expets" if I could get anyone to listen to me, because I know the breed. Go ahead, Bill, and fall for them if you feel you'll never be satisfied otherwise; but sure as you do you'll come back wearing crepe and your pockets will be empty.

Yours, CHAUNCEY.

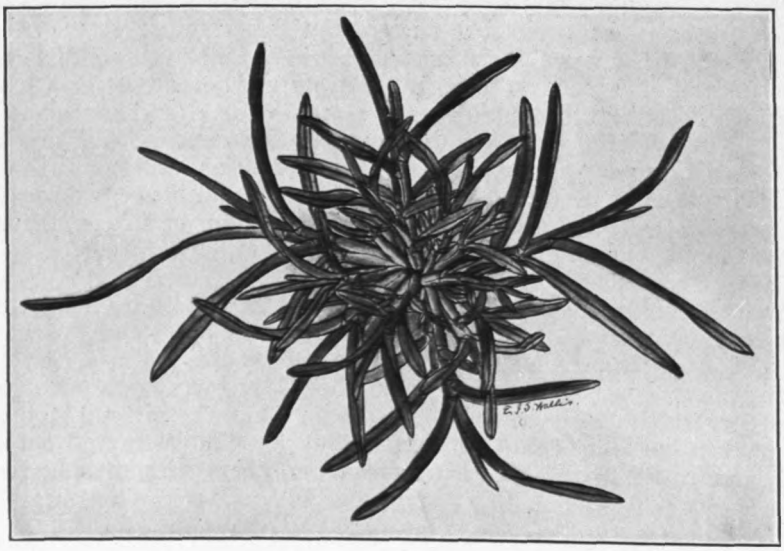
Goose-Grass (Eleusine indica Gaertn)

C. V. PIPER AND R. A. OAKLEY

The grass illustrated is a common summer weed particularly in door-yards, along roadsides, in waste places, but also rather troublesome in lawns and on putting-greens. It is often called yard-grass; not infrequently wire-grass and crab-grass, though these two names really belong to other grasses. About Washington the greenkeepers call it silver crab--grass, on account of the shining white color of the ensheathed stems of the young plants as they appear in putting greens, a characteristic that clearly marks the grass. The roots are much tougher than those of the true crab-grasses, as a weeder quickly discovers.

Goose grass is now generally distributed in the United States. It was long ago introduced from India, its native home. A very similar grass called ragi is cultivated in India for grain, and it is the general belief of botanists that ragi has been developed by cultivating from the wild goose-grass.

The peculiar shape of the flower-cluster readily distinguishes goose-grass when in bloom; young plants on the putting-green are marked by the silver stems and the tough roots.



Goose-grass (Eleusine indica Gaertn).

Fertilizers for Golf Courses

R. J. H. De Loach

In the development of a golf course the putting-greens, the fair-greens, and indeed the entire grounds, the one great object is to have something desirable as a final result—to grow the right grasses in the best combinations and to keep them healthy and rapidly growing in order to have rich, velvety turf.

Sometimes poor links may be traceable to various causes, such as inferior strains of grass, insufficient watering, poor soils, or a lack of the proper plant food in the soil. It is too often thought that the development of good golf courses, lawns, and polo grounds consists of selecting a piece of land and planting grass seeds. This is a part of the plan, but we must keep in mind the fact that not all grass seeds are good; that the soil is subject to many, many variations and its productive power is influenced by almost every change in the weather; and that the plants are injured by worms and insects and by diseases. Unless all the area to be used in putting-greens is uniform, there are sure to be spots of good grass and spots of poor, and so it is with the fairways.

The nearer we can get the greens on a completely artificial basis, both as to soil and as to the plant foods, the better we shall be able to control all the factors and the surer we are to have successful greens.

Granting that the proper grasses have been planted, soils and fertilizers become the most important items to consider. Many of the grasses respond to lime, but most of the species that have been used in developing golf courses are not benefited very much by lime. Some of them do better even if there is no lime. As a general thing it is best to try the lime treatment on golf courses as a last resort, after all other efforts have failed, and then first on a small experimental area.

As for the plant food to be used, most grasses need large quantities of nitrogen in the most readily available forms. If the grasses used are composed largely of fescue, Rhode Island bent, and other bent grasses, ammonium sulphate will likely prove more satisfactory. If it is desirable to establish a bluegrass and white-clover green or lawn, it would be better to use nitrate of soda as a source of nitrogen. With most other grasses it is immaterial which is used. No formula should be used carrying a high percentage of potash, as this has a tendency to encourage clovers rather than grasses. The formula that would perhaps be best suited to most lawns should carry from 3 to 4 per cent nitrogen, 12 per cent of phosphoric acid, and 2 to 3 per cent of potash. All this should come from mineral sources.

Manure is often considered objectionable on golf courses and lawns because of the offensive odors. It does not afford a desirable mat on which to walk or to recline. Another objection to manures is that they so frequently are the means of spreading weeds and undesirable grasses on the lawns and golf courses.

The most successful method of keeping a lawn or a golf course is to lay a good foundation of fairly good but porous soil, plant only the best selected seed, and apply fertilizers as the exclusive source of plant food. The grasses will remain in better condition and will be practically free from weeds. The grass roots soon become well netted and furnish good

ventilation of the soil. At intervals it may be well to cover the fair-greens with dark, loamy soil, but in any event an application of the above formula two or three times during the season will keep the fair-greens in good condition, if the foundation has been properly laid.

The soil for the putting-green should be composed of lighter loam and a good deal of sand. The object here is to grow grass exclusively, and hence the fertilizer used should be strictly a grass fertilizer. The formula should be high in ammoniates and low in phosphoric acid and in potash—about 6 per cent to 7 per cent of ammonia, from 3 per cent to 5 per cent of phosphoric acid, and from 1 per cent to 2 per cent of potash.

The Most Important Thing On a Golf Course

W. A. ALEXANDER

For thirty years I have repressed myself and kept out of print on the subject of golf courses, but the excess waste has at last forced me to write this article. Millions upon millions are being wasted annually on the upkeep of courses and putting-greens because common sense is not used in taking care of them after construction. The putting-green is the billiard-table of your course. It is constructed with a view of being accurate and true for the purpose of gently driving a small sphere into a small hole from a distance of one foot to fifty feet. How foolish to spend $1,000, $2,000, or $3,000 to have a beautiful putting-green and then immediately proceed to allow it to become fit only to walk upon and not play upon! The answer to it all is, Take everything out of your putting-green that should not be there, and take it out all the time, each day and each hour if necessary.

I know there are not a half-dozen golf courses in the Chicago district, and probably not twenty-five in the Metropolitan district (and the same will apply to all districts), that keep their putting-greens clean from grasses and weeds that do not belong there. The putting-green is a delicate fabric; it is intended for delicate play and accurate play. I have in mind at least one golf course that is some nine years old, whose putting-greens were built scientifically correct at the outset, that are today exactly as they were the first year, and the first year they were as true as a billiard-table, and today they have not a weed of any description or any class that should not be there. It has taken infinite pains to keep them this way, but it has paid one-thousandfold to do so. The work of keeping them clean has been as nothing compared with reconstruction, which would have been necessary had they not been kept clean. The grass roots of these greens are from three and one-half to four inches in depth, and you could cut a slit in the edge of any one of these greens and roll it up, if it were physically possible, as you would a rug on your floor. It required no superlative knowledge; it required no expert advice from anybody to accomplish this; it only required diligence and simply attending to one's own business as you would any other thing of value that you might own.

I am prompted to write thus emphatically upon this subject as this country is building hundreds of golf courses each year, employing ex-

pensive architects and spending from $50,000 to $500,000 upon construction of courses. This is a warning that if they are properly constructed, as hundreds of them are, by men who know their business, it is almost a crime to make them and then allow them each year to deteriorate simply from lack of intelligent common sense. Get some member of your club who has the common intelligence to do a good thing and do it well, make him your chairman of the greens, and don't get the idea that the greenkeeper whom you employ and pay to do the work will do this work alone. There are a few splendid greenkeepers, but only a few professionals. Someone who knows can direct and watch him each hour to bring about the best results.

We are building putting-greens scientifically—proper drainage, proper surface, proper soils. Let us keep them when once finished. I know a golf club twenty-odd years old that is now being torn up simply because they have had a series of administrations that have failed for one reason or other, all with good intentions, to keep the fairways and greens up to the original standard. $150,000 at least have been wasted on this course I know plenty of others almost as bad. They will eventually have to be reconstructed.

The delicate foreign grasses that give such wonderful surface and putting textures seem to invite every form of foreign vegetation, fungus, etc., known to man; but it only makes it more necessary to be vigilant. The old golf courses with old grasses, red top, wire grass, and all sorts and kinds of grasses in the fairways, as a rule are harder and tougher and stand more punishment. The average club seems to be satisfied with them; but to know the joy of the good, pure fescue and bent turf is a wonderful feeling if you love the game. *Poa annua* and other invading grasses look well and are satisfactory early in the spring, but as they stiffen and become coarser there is no comparison in the trueness with which the ball will ride into the hole truly and smoothly. In this kind of a green and the one made of the fancy grasses as above stated your watchword should be, Keep the greens clean. A patch of chickweed two inches square will be a foot square in a month, four feet in six months, and cover a quarter of your green in a year.

Poa annua will take your green completely in two years unless taken out—three at the most. Take out your *Poa annua* and your chickweed in March and April; take each dandelion and each chickweed, etc., etc., out with a knife or a tool for the purpose, the moment it shows its head. Make up your mind you will do one thing well on your course, and that is to keep your putting-greens clean and keep them to their original trueness. Putting-greens properly constructed of the right kind of soil and drainage, and properly cared for, should not require a single seed after original construction. I know a course or two that have never had any seed sown upon the putting-greens since the original sowing. In fact, putting seed on putting-greens is merely a waste of time and money. Bad spots should all be filled with turf by a turf-cutter or hole-cutter, taking the spots out and replacing them with the same cutter, filling them with rich soil, watching closely and keeping them watered each day until they take hold. The outer edge of your putting-green can be used for this purpose where the green is large; and you should have a seed bed, and a large one, to draw

upon; and your seed bed should be made of the best soil and taken care of vigilantly and as delicately as you would your putting-greens.

I could write volumes on fairways, green construction, trap construction and the care of them; drainage, fertilizers, soils, etc., etc., but all of them are as naught and unimportant compared with the putting-green.

Keep your putting-greens clean!

Dear Chauncey Letter I

HAZLEWOOD FLATS, IND., September 6, 1921.

DEAR CHAUNCEY:

I'm much obliged for your letter, but you might as well come off your high horse and drop the air of superiority you have assumed. I'd feel a little more like trying a sample or two of your advice to see how it works if it did not carry with it the strong suggestion of finality. You'd make me feel that by following in your steps I can avoid mistakes and get to perfection by the shortest and easiest way.

If you ever go bust in the hardware business and have to make a living you certainly must become an expert, for with your airs and attitude of mind and your ability to respond with an answer to any question you'd have them all beat. I think you'd be able to run a correspondence school in greenkeeping and get away with it.

Now, Chauncey, let's understand each other. I enjoy and profit by your letters because I think you've progressed a good deal as an amateur greenkeeper, but you are a long shot from knowing it all; and just so you'll know I've got your number let me remind you of the ton of worm-destroyer you have in your barn that was sold to you as a favor and at twice the cost of other kinds quite as efficient. Have you forgotten the fertilizer you bought because it was "complete"? You thought you had it on the world because you were able to buy a fertilizer that contained all the essential elements—nitrogen, potash, and phosphorus. You learned all right what constitutes a complete fertilizer, but it cost you about $50 a ton extra to do it, and even at that rate you bought so much that you had it around the place for two years.

In the course of your education you "have fell" for all the experts, one after another, and in many cases twice in the same place.

Instead of pretending to be old John W. Wiseman himself why don't you come right out and show neophytes like me the scars and sore spots on you that resulted from your contact with experts? I'd feel safer asking you a question about machinery or tools because the loft of your barn looks like a museum; it's packed with junk that you've paid high prices for and found perfectly useless. You have tried everything under the sun, and you ought to know. But don't forget that I understand that you were at the head of the sucker list yourself just a few years ago. Your advice will be more likely to be taken if you'll make it a little more interesting by showing in each case how you got your experience. A reformed drunkard was always more appealing as a prohibition advocate than some presiding elder who thought grenadine as sinful as absinthe.

Don't pose, Chauncey, and don't pretend or even let people believe that so far as experts are concerned you have been or are unsullied—a

virgin, so to speak; for if any one ever got his'n, you're him. I want your help, and I want it bad; but I don't want you to forget I've got your number; and I know you've been through what I am going through, and for that reason I want your advice accompanied by an illustrated lecture showing when, where, and how you made your mistakes.

Say, Chauncey, I'm up against it hard this time and want you to help me out. You know old Henry G. Burns—the tightest thing on earth; he could save money where the Scotch would give up in despair. Well, he has played a couple of times on the Long River course, and he swears it is the best course and the best-kept course in the country and that it only cost $15,000 to maintain last year. You know and I know it can't be considered a real course when compared with yours or ours; but just the same the old fossil has me on my toes all the time, and I must either get busy with an explanation of why it costs us $25,000 a year against the $15,000 spent at Long River, or shut up. It's all right to know that we are not wasting any money here, but I am up against it and must show the differences in the figures, and I must be in shape to make Henry eat his words. If you'll help me satisfy or silence Henry I'll take back the cruel words indicating that once even you were on the sucker list.

You can expect business to be poor until the losses of the country have been absorbed and the dead buried. I'm no clairvoyant, but there'll be nothing for at least a year. Ask me a year from now and then I'll tell you when to ask again. Yours,

BILL.

Questions and Answers

All questions sent to the Green Committee will be answered as promptly as possible in a letter to the writer. The more interesting of these questions, with concise answers, will appear in this column each month. If your experience leads you to disagree with any answer given in this column, it is your privilege and duty to write to the Green Committee.

1. *We have an abundance of very fine leaf-mold or humus nearby and would like to know if you consider this beneficial as a fertilizer for putting-greens. The soil is heavy clay; would you suggest putting on the pure humus or mixing it with sand or loam? Also what grass mixture is advisable for such a soil? We would like a grass that would spread. H. B. V., New York.*

This matter is treated very fully in No. 4 of THE BULLETIN, a copy of which will be mailed in a day or two. Briefly, leaf-mold is very desirable material for using in compost heaps, but not desirable for using alone unless the material is spaded in and mixed in the soil. As a topdressing it dries up and blows away, and is not recommended. We do not know what you have reference to as "pure humus" unless it is some of the commercial forms called humus, but which are really mucks. These are altogether too costly in proportion to any value they may have, and some of them are toxic. None of them should be used unless seeds will germinate in them readily. Under your conditions a mixture we would recommend for the fairways would be 4 pounds of Kentucky bluegrass to 1 pound of redtop. It is possible that your soil conditions are not such that bluegrass will

persist. The redtop will be good only a few years. The chances are that gradually your fairways will be taken by Rhode Island bent, which is the dominant grass in New England and New York and which makes most desirable fairways. It is sure to come in and occupy the land. But the bluegrass-redtop mixture is the cheapest for seeding.

2. *In* BULLETIN *No. 5 there is a statement that the best results in the eradication of earthworms have been obtained from bichloride of mercury by applying this in sand at the rate of one pound of bichloride to 100 pounds of sand. Is there not danger in this mixture, first from the handling of the bichloride and secondly from the fact that unless the mixing is thoroughly well done too strong a solution might be applied at a particular point? What objection is there to the method of applying the bichloride in a solution with water, 2 ounces of bichloride to a barrel of 32 gallons? H. F. M., New York.*

In our experience and so far as we are aware, no difficulty arises from the use of bichloride of mercury in a dry mixture as indicated in THE BULLETIN. There is no objection, however, to using this chemical in solution; in fact, we have used it in this way at other times. It involves more trouble and expense but is quite as efficacious.

3. *We are mailing you today three samples or specimens of grass. They are numbered 1, 2, and 3. If it is possible to do so, we would appreciate if you will examine them and advise us the varieties or species. These are taken from grasses growing on our putting-greens. The No. 1 is the most desirable putting grass. Number 3 is the hardiest and best grower. H. A. L., Ohio.*

The specimens all appear to be strains of velvet bent. This is an excellent putting-green grass, and we have made a number of selections which show as much difference as is found between any two of your specimens. It does not spread as rapidly as does carpet bent nor will it stand as much rough usage. There is no seed of velvet bent on the market, but it comes as an ingredient in South German mixed bent. We have some samples that run as high as 50 per cent velvet bent. It is due to this grass largely that South German mixed bent has such a high reputation among golfers for putting-green purposes. You could easily develop these strains by making selections and putting them in a piece of cultivated ground, letting them spread naturally. We find that such a nursery is a very efficient help in keeping up a golf course.

4. *Will you please advise me what would be the best weight roller to use on new putting-greens so as to get the surface even by spring? I have been advised by some to use light rolling and by others heavy rolling. C. W. G., Virginia.*

The weight of the roller to be used necessarily depends on the character of the soil. On sandy soil rollers of the heaviest weight can be used. On clays and clay loams, or even on loams, we would not recommend a roller any heavier than one that would give a proper smoothing to the green. Of course, after the green is once smoothed properly, light rolling will ordinarily keep it in that condition. The general principle is

to use the lightest roller that will give the desired effect. Water-filled rollers are convenient in that the weight can easily be increased or diminished.

5. *Our greens are filled with a lot of coarse grass of which I am sending you a specimen. Can you tell us how to get rid of it? It comes from greens that were seeded about five years ago from seed which we understood to be one-half red fescue and one-half creeping bent. A. D. W., Pennsylvania.*

The grass you send is perennial rye-grass. We can suggest no method of eradicating it other than hand-weeding. We do not recommend seeding a mixture of red fescue and creeping bent, as either does best when seeded alone.

6. *Will you kindly give me your opinion as to the value of tobacco stems as fertilizer for golf turf? This material is available in large quantities. E. J. M., Ohio.*

Tobacco stems are often used as fertilizer in the tobacco-growing districts. They carry a high percentage of potash and also considerable nitrogen. If you could get the tobacco stems ground fine enough so as not to make a litter on the greens they would undoubtedly be beneficial as a fertilizer on putting-greens. We do not think, however, they would cure all the troubles experienced in growing fine turf.

7. *Would powdered charcoal be a good treatment on putting-greens which do not get the sun until nearly noon? The wet weather we have had and insufficient morning sun seemed to be the cause of two of our greens souring and the grass dying off. We have used lime and bone-meal, and while they have been again restored to service we are not certain as to the durability of the surface. T. M., New York.*

The chief trouble with your greens, evidently, is too much shade. To overcome this it would be best to fertilize heavily. For this purpose continued applications of bone-meal should be helpful, and we would also advise the use of sulphate of ammonia at not more than 250 pounds to the acre or 1 ounce to 10 square feet at a single application. The application of powdered charcoal would do no harm, but we have never seen sufficient benefit from it to justify the expense of using it.

8. *Our greens are in fairly good shape from last year's seeding. If we should not be able to obtain any satisfactory bent or red fescue seed for fall sowing, would you recommend that we use redtop alone this fall and then use bents or fescues next spring and fall? R. A. Y., Indiana.*

As you say your greens are in fairly good shape, we do not believe there is any need of reseeding with anything this fall. Redtop will give you a better-appearing green for a few weeks this fall, but after redtop gets beyond its seedling stage it is coarse and unsatisfactory on a putting-green. We believe it would be better for you to put on a fine top-dressing of compost and try to improve the grass that is already on the greens rather than incur the expense of sowing seed of poor quality on the greens at the present time.