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YOUR DRIVER?



DO YOU OVERSHOOT
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IF YOU HAVE *ANY* "BAD SHOT" CLUB
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Red Beam

**. . . The ONLY Golf Club Set That's
Precision-Matched And Charted**

Every Pro knows that a club out-of-match with the rest of the set can spoil the timing of the swing, often with disastrous results.

That's why so many leading Pros across the land are welcoming and recommending this new, precision-matched "RED BEAM" Set by BRISTOL.

**Introduces A New Standard Of
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With measuring instruments of minute exactness, each wood and iron in BRISTOL'S new "RED BEAM" Set is *precision-matched* with every other club in the set. Matched in not just one or two ways. But matched with new precision in *all four* important measurements of *weight, balance, loft and length*.

No wonder Pros and expert golfers are so

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**Exact Specifications Of
Each Club Charted**

A graphic chart (BRISTOL copyright) comes with every "RED BEAM" Set. This shows each club's exact specifications, its super-matching in all respects with all other clubs in its particular set. This chart provides a visual and positive guarantee that every club in the set is matched and balanced "right on the beam." BRISTOL "RED BEAM" Sets are sold only in complete sets and through Pro Shops exclusively. The Horton Bristol Manufacturing Company, Bristol, Conn. ORIGINATORS OF THE STEEL GOLF SHAFT.

Mac Shows the Master's Hand In Pro Shop Operation

Carroll T. MacMaster is in his 17th year as pro at Woodholme CC, Pikesville, Md. Mac's been in pro golf in Maryland 27 years and was active in the development of golfing talent at White Plains, N.Y. for several years. When a young man can say that he worked for Mac and got the Old MacMaster's O.K. you may be sure the lad is good for Mac at 53 is one of the stars in combining mature experience with the newest ideas in serving members.

His shop is 10 years old; cinder block construction with shingle roof. It's location is fine, with No. 1 tee, 18th green and the No. 12 tee which is used as a starting tee on week-ends, all about 40 yards from the shop.

The shop is 20 by 55 feet with full size basement. The showroom is 20 by 25 feet with the remainder of the first floor being rack space. There are 400 racks on the first floor and 150 racks in the basement. The basement also has the pro office, rest rooms for men and women, an oil burning, forced hot air furnace and soft drink cabinets. Soft drinks are sold from a window in the rear of the first floor.

Mac says the shop would be more convenient if all on one floor and that the chimney in the center of the building takes up space and prevents completely satisfactory arrangement of shop stock. The basement is damp in the summer when the furnace isn't operating.

The shop floor is hardwood, covered with masonite upside down which has been satisfactory.

Mac rearranges the shop each year and repaints every winter.

The shop is very well stocked with golf, tennis and swimming items, with display made to attract close inspection and handling.

MacMaster believes in keeping his members reminded that the shop is a complete service station for the member. One of his spring letters reads:

Dear Member:

Just a wee line to let you know of the golf shop changes for 1950. We have remodeled the place—complete with a new paint job and there is a brand new supply of clubs, bags and all other necessities. You will find golf clubs in all price ranges, from \$4.00 a club, to \$85.00 a set for the top grade irons. Bags in all price ranges and materials, bright colored nylons, canvas and leather. All the leading lines of balls priced from \$.55 to \$.95 may be purchased. Also on supply are the accessories, such as golf gloves, sweaters, windbreakers, caps, hats, hose, golf umbrellas, tennis balls, head covers, golf shoes with spikes or rubber lug soles.

On hand to serve you at all times, will be Tommy Sullivan, Charles Mannion, Bobby Miller and I. The Golf Shop is open seven days a week. Tommy and I will be available for lessons on Tuesday, Wednesday, Thursday and Friday. Just call Pikesville 501 for an appointment.

Any time you do not have a game but wish one, just call the shop and one will be arranged for you, wherever possible. The blackboard still remains in the shop where we post all messages. Also, the handicap racks are in the shop, please put down all scores, so we can arrange correct handicaps for all.

I want to thank you for your patronage during the past year, and hope it will continue for many years to come.

Sincerely,
Mac
Your Golf Pro

P.S. One Golf lesson in the spring will do more good than two in the fall.

Top—Even the pup "Duke" welcomes Woodholme members at MacMaster's shop. The Old MacMaster is flanked by caddie-master Charles Mannion at the left and ass't. Tommy Sullivan at Mac's right. Bottom—A lot of stock attractively displayed without having a crowded, disorganized appearance, makes profitable use of compact space in MacMaster's shop. The lighting fixtures bring sunshiny look inside.



Converting to Bent in Tenn. Saves on Maintenance*

By CHARLIE DANNER

Supt., Richland GC, Nashville, Tenn.

During the past three years there has been much progress made with bent grass in Tennessee and other Southeastern states. One club in Knoxville has converted all 18 greens to bent grass and another club in Chattanooga has converted six greens so far and plans to finish the other 12 greens this year. An Atlanta club put in one bent green last fall as an experiment in that section. At Richland Club in Nashville we have only one green in Bent but plan to convert just as soon as funds are available. At present a \$200,000.00 club house under construction must be completed before funds can be made available for conversion to bent greens.

For many years clubs in the South have tried experiments with bent grass, using various methods to convert. Some clubs tried killing off the bermuda with chemicals, then sowing seed or planting stolons. Others tried to strip off the bermuda and then plant bent and still others tried to sow bent seed on a bermuda green. None of these methods was successful.

Several years ago we organized and held Turf Conferences in the South. Dr. Fred Grau and O. J. Noer participated and told us the advantage to be gained by proper sub-drainage and proper mixture of top soil to provide for drainage and aeration and stressed their need in the South. They told us about the new and superior strains of bent grasses that had been developed.

After Dr. Grau visited Nashville my club decided to experiment. We converted one green to bent grass. The following method was used. We took off the top fourteen inches and dug tile lines, then back filled the lines with pea gravel bringing this material up to where we needed approximately ten inches of top soil to complete the green. This top soil was mixed in the barn using 60% sand, 20% loam and 20% peat moss. We hauled it to the green and then planted Arlington C 1 stolons at the rate of one bushel to each 100 square feet. This work was done in December 1948. The green was opened for play in April of 1949. We had a little trouble in July and August of 1949. This trouble was not due to disease but was due to our inexperience in mowing bent grass, but in September the

green was completely healed and we have had a perfect bent grass green ever since.

The cost of converting this green was approximately \$100.00 for each 500 square feet. Much to our surprise we feel we are going to get this back in the savings on maintenance. We find the bent grass green to require less top dressing, less mowing, less water and less fertilizer and we have a year round green that we don't have to sow with rye grass in the fall and no transition period in the spring.

Comparative Costs

For comparative costs in maintenance, bermuda grass needs frequent top-dressing to keep the stems buried to provide a smooth putting surface and when rye grass is sowed on top of bermuda in the fall a heavy top-dressing is needed. Our bent green was top-dressed the last time during September of 1949 or 16 months ago. The savings on this one item of upkeep are tremendous. Our bermuda greens require a lot of water while our bent green needs very little water. We believe this is due to the better mixture of top soil we have in the bent green. Both bermuda and rye grass are fast growing and need mowing often, bermuda grass must be mowed seven days a week during the summer months while bent grass requires mowing not over three or four days a week. Both bermuda and rye grass are heavy feeders and need frequent applications of fertilizer, we find that our bent green needs 65% less fertilizer than our bermuda or rye greens. As bent is a year-round grass we don't have to buy rye grass seed in the fall which results in a big saving on that item.

During the summer months we swept the dew off the bent green every morning. A mixture of Calo-Chlor and Tersan was applied each week at the rate of three ounces to each 1 M sq. ft. to prevent brown patch. Cadminate was used every other week at the rate of 1½ ounces to each 1 M sq. ft. to prevent dollar spot. We fertilized the soil whenever the tests showed the need of nitrogen, phosphate or potash.

Our thanks go to Dr. Grau and Dr. O. J. Noer for their help and guidance. Before these men began to visit with us we were groping in the dark but now we feel that better days are ahead for Southern Golf Courses.

* Presented before Annual Turf Conference, Chicago, Ill., Feb. 1, 1951.

Golfercraft's New Marvel of Design!

TRU-SIGHT IRONS

FRED HAAS, JR.

GOLFCRAFT'S TRU-SIGHT IRONS are the greatest development in club design of the past 50 years—and worthy of Golf's Hall of Fame. In Fred Haas, Jr.'s words—"they are irons with a built-in sense-of-direction; designed to make straight, true iron shots come easier and more often for all golfers." TRU-SIGHT Irons are sold by golf professionals only. Ask your pro to show you a set today.

TRU-SIGHT • STRAIGHTEST-SHOOTING IRONS EVER!

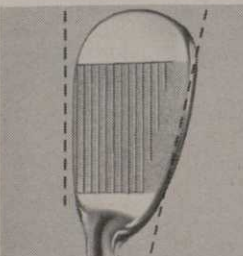


Extra!
TRU-SIGHT IRONS include

Golfercraft's famous TRU-GOOSE design which allows playing all shots off the left heel, with greater accuracy and distance



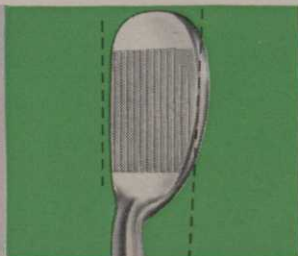
WEIGHT, in the wide-bottomed, smooth-backed TRU-SIGHT blade, is greatest behind hitting area for explosive power on impact.



CONVENTIONAL IRON from above. Note how top of blade moves out at sharp angle from bottom and is far from parallel with it. Lining-up shots is difficult. Player confidence drops.

WE STRIPPED THE FAT AND PACKED THE MUSCLE!

See how compact the TRU-SIGHT blade is—compared to a conventional iron of the same weight. This concentrated power is easier to control; and resistance to the club head is lowered when playing out of the rough.



TRU-SIGHT IRON as seen from above. Note how top and bottom of blade are closely parallel. Lining-up shots in the rough or on the fairway is easy—direction certain. Player confidence soars.



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EXCLUSIVE NATIONAL DISTRIBUTOR OF PENFOLD GOLF BALLS

Increase Capacity for Play By Streamlining Course^{*}

By **PACKEY WALSH**

Supervisor of Golf, Chicago Park Dist.

Today golf is big business. According to estimates by the National Golf Foundation for 1949; more than 63 million rounds of golf are played annually; over 3 million golfers play more than ten rounds each year; and the present dollar value of golf properties and plant is estimated at 975 million dollars with an annual maintenance cost of 44 million dollars. Conservative estimates, based on factory cost, place the amount of golf equipment manufactured yearly at more than 26½ million dollars. This last figure does not include clothing and other sports accessories indirectly related to golf.

This is big business. This is a far cry from the golf situation in the early part of this century when the game was regarded as a rich man's pastime and was associated with top hats and silk shirts. Today, the so-called daily fee or semi-private courses and the publicly owned municipal courses far outnumber the private golf preserves previous to World War I and the bulk of the huge dollar volume of merchandise and playing fees annually enjoyed by the industry comes from the working man—the plumber, the mechanic, the clerk, the housewife and the student. They are the source of our bread and butter.

We can all be congratulated for the truly phenomenal growth of the game. I, as a golf professional with both private and municipal golf course experience, have contributed something to the picture by promoting the game in my teaching and in my daily contacts with the public. You, in your profession, have played an equally important part in keeping the game fascinating for the millions of golfers that tee off on your courses every year.

The very nature of the game has made our job, yours and mine, a pleasant one. It is one of the few sports where almost anyone can play, regardless of age or sex. It is a game that can be enjoyed by the individual as well as the group and one that offers a refreshing change of scene and pace to almost everyone, regardless of his daily work. It can be a source of physical exercise, mental relaxation and exhilarating competition for everyone—and Americans, recognizing this, have adopted it wholeheartedly.

The game is so universally accepted that golf equipment and clothing have joined the necktie and the gloves on the average individual gift shopping list. The recurring golf outing has become a fixture in many industrial recreation programs. And, finally, many municipalities, ever cautious about the expenditure of public funds for new recreation projects, have bowed to the demands of the public by recognizing the golf course as one of the important parts of the public recreation plant.

At the outbreak of hostilities in the last war, golf operators and employees began casting about for defense jobs and other occupations divorced from the golf picture because the general feeling was that golf was too trivial a matter for Americans in a time of national emergency.

We were all amazed, I think, to find that it was during the war years that golf really came into its own! More and more people, fatigued by the problems and tensions of war-time, turned to golf for a refreshing and strengthening change of pace. Medical men of the Armed Forces recognized the value of physical and psychiatric therapy that golf worked on minds and bodies damaged in combat and welcomed the cooperation of golf operators in the vicinity of the government's general hospitals. It was here that we in golf made our greatest contribution to the national war picture. Golf courses offered the free use of their facilities to the wounded G.I. and later, to G.I.'s in general. The game was a revelation to many of them who had never been near a golf course in their lives. To others, who had regarded it as a rich or old man's game, it was a new thrill. Thousands of veterans, brand new converts to the game, included golf clubs in their inventories of necessities for the full civilian life!

Post War Boom in Golf

This war-time surge in popularity set the scene for a post-war boom in golf, the greatest the game has ever known. And what did we in golf do about it? Here is the sorry picture we've kept turned to the wall for the past five years:

The relaxation of material and labor shortages following V-J Day brought hordes of golfers trooping to the golf courses all over the nation—and what

^{*}Address at NGSA Convention, Chicago, Ill., Jan. 31, 1951.

(Continued on page 78)

Soil Aeration Prime Factor in Development of Turf

By THEODORE T. KOZLOWSKI

Head of Department of Botany, University of Massachusetts

In order to maintain healthy grass it is necessary to have oxygen continuously supplied to roots in adequate amounts. This, however, is only one of the factors of the environment which enter into the complex of all the factors which influence growth of plants.

In a real sense the growth of grass, as of other plants, is determined by interacting genetic characters and a great array of environmental factors. A number of internal physiological processes and conditions in plants are affected by the environment and changes in rates of these processes result in turn in growth differences. The manufacture of plant foods (carbohydrates, fats and proteins), permeability and extensibility of cell walls, digestion and translocation of foods, respiration, absorption of mineral salts, and intake of water as well as loss of water by transpiration might be listed as being among the more important physiological processes involved.

Environmental factors which have a profound effect on growth of plants include the climatic factors (temperature, light, precipitation, humidity, wind, gases), the soil or edaphic factors (origin and classification, minerals, temperature, aeration, pH, organisms, texture and structure, organic materials, etc.) and the biotic factors (insects, cultivation, birds, grazing animals, fungi, pollination, etc.).

Improper Aeration

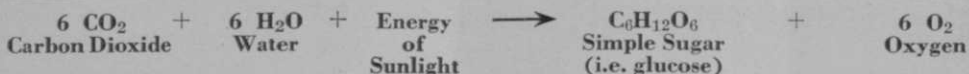
On the golf course improper soil aeration is generally the result of incorrect watering or compaction. Too much water without proper drainage will result in air spaces being occupied so aeration is inadequate. Compaction at or near the soil surface also means that water cannot move through such a layer and the very necessary exchange of gases between the soil and the atmosphere is prevented. Among direct causes of compaction are player traffic, proper and improper use of equipment, precipitation, and artificial watering. Aggravating causes of compaction include soils

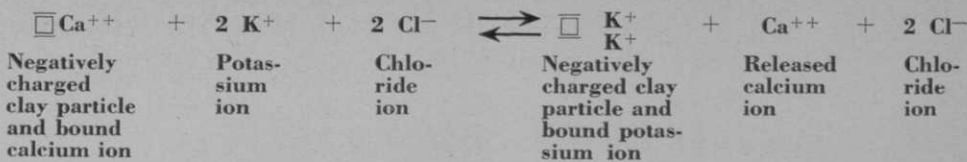
of too heavy texture, soils low in organic matter, overwatering, poor drainage, too acid soils (usually pH 5 and below resulting from residual action of ammonium sulfate), too alkaline soils (usually pH 8 and above resulting from residual action of sodium nitrate), and necessary eradication of earthworms and soil insects.

Indicator Plants

Compaction will finally result in poor root growth, thatching, hard greens which will not hold pitch shots, anaerobic soil conditions which influence beneficial bacteria and the nitrogen cycle, hard greens which will not absorb rain water or artificial water since it will simply run off the compacted ground, and the prevalence of weed species. Compaction can be relieved by disc harrowing with a disc set straight, spiking, tyning, forking, terferating, aerifying, using "night crawler" machinery or by fertilizing judiciously, liming, or increasing the organic matter content of soil. Under certain field conditions, indicator plants may give some idea of the degree to which turf areas have become compacted. Presence of clover indicates moderate compaction, plantain indicates medium to heavy compaction, and knotweed warns of heavy compaction.

Two of the most important physiological processes of plants which influence growth are photosynthesis and respiration. Photosynthesis is the process in which simple carbohydrates are synthesized from carbon dioxide and water by the green leaves of living plants in the presence of light, and oxygen is released as a by-product. The process is generally rated as the most important biological reaction since it is a basis of production of food materials. Carbon dioxide gas from the atmosphere diffuses into leaf tissue through stomatal pores and the reaction takes place. Food formed in this process is used for leaf development, and the excess is transported and used for growth of stem tissues and root tissues. The process can be summarized by the following balanced chemical reaction:





Respiration is defined as the oxidation of foods in living cells resulting in the release of energy. In a sense respiration is the opposite of photosynthesis and the process could be summarized by simply turning the arrow around in the summary equation above. It would then be the case that a simple sugar is oxidized and the products of the reaction are carbon dioxide, water, and energy. This energy which is released is of great importance to plants for carrying on a number of other necessary physiological processes. Energy released in respiration is necessary for synthesis of fats, amino acids, and metabolic products. It is necessary for migration of chromosomes and translocation of other cell constituents during cell division. Respiration energy is also necessary for streaming of protoplasm, growth of stems, growth of root tips, and accumulation of ions or molecules. Although photosynthesis is carried on during the daytime only and by green cells exclusively, the process of respiration is carried on by all living plant cells and goes on during the day and night.

Respiration of Roots

Respiration of roots is especially important but in order for this process to go on at a favorable rate, a continuous supply of oxygen must be made available to roots: Unless rates of processes are in proper balance, there will be metabolic disturbances which will result in poor growth. Root respiration may be either aerobic or anaerobic. Aerobic respiration takes place when atmospheric oxygen is available while anaerobic respiration takes place in the absence of atmospheric oxygen. Most roots must carry on aerobic respiration. When they are forced to substitute anaerobic for aerobic respiration, the rate of energy release is not great enough to maintain cell processes and bad effects are soon produced on plant tissues. This is essentially what happens when soil is flooded for too long a time or when soil layers are impermeable because of severe compaction.

With only a few exceptions all the mineral elements which enter into plant composition come from the soil. A normal rate of aerobic root respiration is required for intake of such nutrients. Clay particles of soil are generally negatively charged and tie up certain positive ions so they are not available to plants. Consider the case

where calcium ions are tied up with negatively charged clay particles. If a solution of potassium chloride is added to such a soil some of the added potassium ions replace the calcium ions and render them available for plants. The calcium ions would be available only after such release. This type of exchange, called base exchange or cation exchange, could be represented as shown above.

Each clay particle may have a number of such ions tied up with it and some other positive ion must be added to replace those tied up with the clay. When root respiration is normal the carbon dioxide which is released into the soil combines with water to form carbonic acid. From the carbonic acid (H₂CO₃) the H⁺ ion is available to displace ions tied up with the clay and therefore such ions are released and made available to plants. When respiration is inhibited by poor watering or compaction this kind of ion exchange does not take place properly and chlorosis results.

Reduced aeration of soil results in a number of morphological and physiological effects on turf grasses and other plants. Reduced aeration results in cell walls in roots that remain abnormally thin. Root hair formation is usually suppressed as a result of reduced aeration and this generally results in an inability of the plant concerned to take in enough moisture. Root branching is less complex and roots are less numerous. Poor aeration will result in decreasing the production of dry weight of roots and the roots are shorter and occupy less space. Leaf areas and the number of chloroplasts may also be reduced. A pronounced chlorosis may develop which will be correlated with decreased intake of ions as previously considered.

Results of Reduced Aeration

A number of adverse physiological effects may also result from reduced aeration. Roots quite often change from aerobic to anaerobic respiration, at least in part, with a consequent accumulation of by-products. By-products of anaerobic respiration are quite toxic to plants when present in significant proportions. Carbon dioxide and alcohol are regular products of anaerobic respiration and such respiration is essentially identical with alcoholic fermentation when carbohydrates are present. Under certain conditions it approaches other types of fermentation and the following

(Continued on page 85)

"I use 'TERSAN' to prevent brown patch ... it never shocks turf"

says William Glover, Greenkeeper at FAIRFAX GOLF CLUB, Fairfax, Va.

A public course such as Fairfax must keep its greens in top shape to attract players, and to sell itself every day. "That's why I use Du Pont 'Tersan' fungicide," says Mr. Glover. "It prevents brown patch safely."

This picture story is another in a series of "experience reports" from well-known golf courses, coast to coast.



"I've used 'Tersan' since it was first produced," says Mr. Glover, who helped test this product before it was marketed.



For sure prevention of brown patch, Mr. Glover sprays with "Tersan" every ten days. "It's very easy to handle," says Mr. Glover. "Needs no wetting in." Picture shows ninth green being sprayed with "Tersan."