

worth following and his demonstration on how to mix your own fertilizer was a 'knockout.'

"Prof. A. L. Prince chose for his subject, soil acidity. He discussed importance of soil reaction and nature of and causes, types of soil acidity and remedy, the pH. scale and its interpretation, also tests for soil acidity. In one of his lectures Prof. H. R. Cox dealt with forms of lime and use in growing grasses, how much lime to use to correct soil acidity of a given pH. for a certain crop and in certain soil.

"Dr. R. L. Starkey in one of his lectures stressed the importance of having organic matter in the soil, from its plant food value and its physical and biological affects. He also discussed the sources of organic matter and what to expect from the peats, manures or composts under different conditions and varying stages of decomposition.

"Miss Jessie Fiske, Seed Analyst at the state college, gave an interesting lecture on grass seed, testing and identification. She then took them into the laboratory and showed them how different tests were made for purity, germination and let them have a whack at identifying the seeds for themselves.

"Dr. R. P. White lectured on plant diseases and their control. You should have heard this fellow White discuss the different parasitic fungi and bacteria and how they injure and cause disease in the grasses and other plants, and also the many and different varieties of chemicals and other means that have to be adopted to cope with those diseases.

"Dr. Sprague came into the picture again and gave the men pointers on caring for turf and starting new turf on fairways and lawns. He also gave a summary of some results of their fertilizer experiments on turf grasses at New Brunswick.

Offers Bulletins On Turf Pest Control

"Prof. Clyde C. Hamilton, associate entomologist at the Experimental station told the class of experiences in the control of insects and pests. Dr. Hamilton was asked many questions on the chinch bug, ant, mole, and beetle control, and gave out bulletins regarding these subjects; the information of which he had collected from his own and his associates' experiments all over the country. These bulletins can be had by anyone writing to Dr. Clyde C. Hamilton, care of New Jersey

Agricultural Experimental Station, New Brunswick, N. J."

At Iowa State college, March 1 and 2, a hundred greenkeepers and members of allied professions, gathered for the biggest short school in course maintenance that the state college had ever conducted.

Iowa Courses Helped by College

The Iowa situation is unique. Not only has the State College gone into a WPA golf course construction and maintenance program that keeps the faculty close to the practical problems of golf courses, but the state Greenkeepers' Assn. and the college have had the closest sort of working arrangements during the past several years. Prof. Vernon Stoutemyer who has been engineer of the short courses, and other members of the faculty, headed by Professors Pickett and Firkins have pitched in and contributed such practical help that the tall corn territory can lay good claim to having the best general standard of large and small course maintenance of any state in the union. If you want to argue about this, go to Iowa but don't write us.

A guest artist lead off the Iowa program. Prof. L. S. Dickinson of Massachusetts State college spoke on "The Profession of Greenkeeping," counseling an executive and economical character of management rather than the mower-jockey and gang-boss type of course operation which misses opportunities to improve the course, save money and build up the greenkeeper.

Warnings from all over the country were echoed by Herb Graffis, GOLFDOM'S editor, in a talk on comparative course costs. Graffis reported comments from experienced green-chairmen who detailed the difficulties of trying to compare costs of one course against another as inexperienced chairmen often try to do. However, he gave voice to the observation of many greenkeepers in reciting that course costs, already cut tremendously because of labor reductions since the depression started, were due for keener study due to hiking labor costs per man. He forecasts that cost study would be recognized as an expert study in determining trends of management, just as fertilizer, disease and weed problems required the attention of specialists.

B. J. Firkins of the Iowa State college faculty presented some specimens of top-dressing supplied by greenkeepers attend-



This fine turn-out of 80 men attended the Iowa State conference.

ing the school. Firkins, a happy combination of practical man and laboratory scientist, analyzed these specimens and their probable results and conducted a round table session with O. J. Noer as team-mate expert on the clinic.

E. V. Collins, also of the college staff, conducted a forum on equipment maintenance. He brought out the lessons learned in farm equipment maintenance and from that point Collins and the greenkeepers exchanged experiences. It was about a toss-up as to whether the man operating the machine should be responsible for its adjustment and maintenance. One of the interesting points brought out was the effective use of compressed air, rather than water, in cleaning equipment after use.

Noer and Dickinson repeated on the Iowa program with close-up stuff the second day. Noer related experiences with common sources of turf trouble and Dickinson lectured on control of turf diseases as well as conducted a question-box on greenkeeping problems.

Professor Pickett spoke on research and turf culture, pointing out that the policy of the research man was to follow to the fullest limit the common sense hunches of the practical greenkeeper in appraising what part of these hunches was really sound and what part was misleading.

Weed control developments were surveyed by W. E. Loomis of the Iowa State botany department and insect control by C. J. Drake of the institution's zoology department.

Fine Meeting At Minnesota

University of Minnesota again assembled its great staff of agricultural school experts to gang up with greenkeepers in an annual checkup of maintenance problems.

The hardy Norsemen want the whys and wherefores and got a bountiful menu served them on the program. A practical novelty on the program was the lecture by Ralph T. King of the university's faculty on "golf courses as wild life refuges". King's address, which will appear in an early GOLFDOM, was rated not only by the assembled greenkeepers, but by such hard-bitten short school veterans as Dickinson and Noer, the most interesting short course address heard in years.

Program Covers Many Subjects

A. H. Larson experted on identification of plants and on plant structures and their functions, H. L. Parten on control of gophers, moles, ants and similar pests, and J. B. Torrance gave lectures and demonstrations on gasoline engines.

Along with those practical authorities were L. E. Longley, lecturing on nursery practice and on evergreens, Carl J. Eide of pathological effects of sprays and insecticides and the nature of fungi, and C. O. Rost, conductor of the short course, on soil conditions and plant growth and soil tests and their interpretation.

Prettying-up the clubhouse grounds was aided by Louis Sando who spoke on culture of annual and perennial flowers. A. R. Gemmel held a clinic on new diseases of metropolitan bent, A. A. Granovsky described factors affecting the occurrence of insect pests, W. W. Meyers told of the principles of plant genetics and A. R. Gemmel described plant movements in growth.

Prof. Dickinson, the Massachusetts State pioneer in greenkeeping short courses, lectured on control of turf diseases and the methods of keeping within the ranges of tolerance. Dickinson also

Factors Controlling Turf Management

SOIL deficiencies in essential nutrient materials invariably accompany poor initial stands of grass, and are associated with the deterioration of established turf. Although fertilization is the most important single factor in turf growth, maximum efficiency from fertilizer usage is obtained only when other related factors are favorable also. The major factors include:

1. Selection of Grasses Suited to Local Conditions
2. Favorable Air Temperatures
3. Sufficient Light
4. Moisture
5. A Fertile Soil
6. Protection from Injury.

Some of these are not susceptible to change, but others can be modified to promote growth; or to avoid serious damage during unfavorable seasons, or brief periods of adverse weather.

I. USE OF GRASSES SUITED TO LOCAL CONDITIONS: At one time it was customary to sow a variety of grasses on the assumption that grasses adapted to local soil and climate eventually predominate; and it was believed that differences in the growth habit of the several species tend to provide green turf throughout the season. The principle objection lies in the unsightly appearance caused by distinct patches of the different grasses.

In most northern sections Kentucky blue grass eventually dominates grass lands and meadows, and accounts for the frequent recommendation to seed areas devoid of shade to Kentucky blue grass. Blindly following such procedure has resulted in some conspicuous failures, for there are localities and soils which are unsuited to blue grass.

Except in dense shade, Kentucky blue grass or fescue should constitute the bulk of the seed mixture. Kentucky blue grass, but not fescue, is best in the district extending from Washington to St. Louis. Elsewhere choice is govern-

ed by soil condition. On sandy soil fescue is usually preferred, but it will thrive on heavy, well drained, soil also. For best growth of Kentucky blue grass, soil must be well supplied with available phosphorus, and must not be too acid. Unless these are corrected, Kentucky blue grass is apt to fail. Fescue, on the other hand, can withstand more acidity, and needs less phosphorus.

For shady locations, poa trivialis and chewings fescue are best. They are the principal constituents of the better so-called shady lawn mixtures.

II. FAVORABLE AIR TEMPERATURES: Both rate and character of growth are profoundly affected by temperature. Yellow or purplish colors are often associated with low temperatures, and growth may be so slow that the plants succumb to the ravages of insect pests. With higher temperatures, rate of growth is rapid, plants are taller but less robust, making them more susceptible to fungus diseases.

Various plants differ in their growth response to climate. The northern grasses prefer moist cool weather, so turf is usually at its best during spring and fall, especially in sections where July and August are hot and dry. Obviously, to obtain maximum benefits, major fertilization should occur during these two favorable growing periods.

Since climate cannot be modified, varieties of grass suited to local climatic conditions should be selected. As an example, some of the strains of bent which thrive in the cooler northern sections are not suitable in regions where extreme heat prevails during mid-summer, and modifying cultural or fertilizer practices will not entirely adapt them to the new environment. Their extensive use may become a costly experiment.

III. SUFFICIENT SUNLIGHT: The necessity for sunlight is common knowledge, but the function of light is not always clearly understood. In green leaves, sugar synthesis depends

The A B C of TURF CULTURE

upon a source of radiant energy supplied by sunlight; and the presence of chlorophyll, which is the green substance in the leaf. These sugars serve as energy material, or are needed in the synthesis of other essential plant products.

Severe leaf defoliation by frequent close cutting may result in gradual turf deterioration. Leaf surfaces are so curtailed that adequate sugar production becomes impossible. In this respect grasses differ, due to differences in growth habit. Under close mowing, prostrate growing grasses such as bent and bermuda, retain relatively more leaf surface than erect growing blue grass and fescues. Hence bent can be cut close with impunity, but there is evidence to support the belief that blue grass and fescues should not be cut closer than 1/4 to 1/2 inches. In spring and fall somewhat closer cutting can be practiced, but with the approach of summer, mowers should be raised gradually.

Turf frequently shows striking effects due to shade. Clover and crab grass may overrun closely cut lawns or fairways, and be wholly absent in the adjoining rough. The taller grass in the rough effectively excludes light, so these dwarf growing plants cannot survive. During the germination period of crab grass, it may be possible to obtain some measure of crab grass control by allowing somewhat longer growth of grass to shade the ground.

Turf maintenance under dense shade is difficult, because the over-hanging foliage absorbs the active light rays and thus deprives the grass of needed energy rays.

IV. MOISTURE CONTROL: In amount, water is the main constituent of green plant tissue. It imparts rigidity to plant structures, is the vehicle for the transport of various nutrients; and in the leaf serves as a raw material from which sugar is produced. Transpiration, or evaporation of water from the leaf surface, tends to control plant temperatures.

The demand for water during a single season is enormous, often reaching 3,000 to 5,000 barrels per acre. Because of their shallow root system, grasses are among the first plants to suffer during dry periods. The surface soil is quickly exhausted of available water, and upward movement by capillarity is too slow to compensate for this loss.

Too much water can be just as detrimental as too little. As soil moisture increases, growth is likewise increased up to an optimum, then there is an abrupt decline until growth finally ceases. Death occurs when roots are unable to obtain needed oxygen from a soil completely saturated with water.

Too rapid growth creates thin cell walls; then leaf structures become so weak and succulent that they bruise easily and are ready prey for insect pests and fungus diseases. Beside moisture, excessive nitrogen and optimum temperatures also speed rate of growth, so when all are combined, complete turf loss may result. The evil effects of over-nitrogen feeding can be partially overcome by reducing soil moisture to a point where growth is barely maintained. This tends to strengthen leaves and stems. Very few appreciate the importance of sensible watering practices.

V. A FERTILE SOIL: In a broad sense, fertility refers not only to the presence of ample nutrients, but to the existence of other favorable factors as well. Hence soils may contain an abundance of plant nutrients and yet be infertile.

In turf management, once coverage is obtained, it is impossible to profoundly modify the underlying soil. Since a favorable soil foundation is so necessary, the various factors involved will be discussed in the succeeding installments.

VI. PROTECTION FROM INJURY: These are negative factors which resolve into protection of the turf from mechanical injury, the ravages of insects, such as sodweb worm, chinch bug, grubs of the May, June, Japanese and Asiatic beetle, and the damaging effects of fungus diseases such as brown patch, dollar spot, pythium, leaf spot, snow mold, etc. Unless controlled, they may defeat any program of turf improvement.

Each of the above fundamentals is important and vital—there must be consistent follow-through—from plant feeding to turf protection—if strong, healthy, luxuriant turf is to be produced and maintained.

(To be continued)

Presented by THE SEWERAGE COMMISSION MILWAUKEE, WISCONSIN
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MILORGANITE
PROMOTES UNIFORM, HEALTHY TURF GROWTH

repeated his Iowa State lecture on the profession of greenkeeping.

How to find out what it costs to maintain a golf course was a most helpful lecture delivered by F. E. Koller of the Minnesota department of agriculture staff. Herb Graffis, *GOLFDOM's* editor, followed up on a session held previously by Twin City greenkeepers and chairmen, with a talk on how the newer social concepts are affecting course labor management and budgets.

Kent Bradley and Sherwood Moor ably digest the year's concluding state short course by reporting the Massachusetts State college course which has grown into a recreational conference.

From the ringside, write Bradley and Moor:

Conference Attracts 1,000

Nearly one thousand visitors were at the Fourth Conference on Outdoor Recreation held at Massachusetts State college, in Amherst, March 11 to 14. While most sports activities were represented, golf is still in the lead in interest and attendance. Professor Dickinson's winter greenkeeping school has grown to six-ring circus proportions. As usual, golf superintendents from many geographical sections attended this year. Twenty-five were at the regular and advanced courses.

Arthur Anderson of Brae Burn told what the school has done for him, mentioning that records he keeps now mean something. He learned to think further, and make keener observations. A desire to make further investigations in pertinent subjects was aroused, and a clearer understanding of all course factors resulted. Anyone who takes the short course is in an excellent position for advancement when the occasion occurs. (Anderson was able to take the helm at Brae Burn, when the late John Shanahan died.) Although Arthur took the first course of study 10 years ago, he is still realizing returns from it. To-day's course of study is much further advanced.

Robert Williams,* of Chicago, told why he came back and studied in the advanced course. Unorganized facts in his mind have been put in order, he learned to think, and not jump to hasty conclusions. His work is now interpreted in a business-like manner which is more professional.

Geoffrey Cornish, a student from Canada, read a paper on course labor, mention-

ing that the education standards of greensmen has gone up. There are more high school men working on courses today than in any other year. Quoting him from notes taken, "Labor qualifications, ages 21 to 31 prime; race not essentially a basis for qualifications; consider ability to tackle any job assigned. Mental and physical strength should be an important factor. Should have good self control; enjoy job; a good judge of time required to do given tasks; able to think for himself. Farm-raised men best; those used on construction not always best for maintenance. They should be regarded as skilled craftsmen if they meet course requirements, although many clubs commit folly of not paying to get and keep them. Wages too often the least the men will stay on for. We need the same type of men that are being reabsorbed by industry; we can compete with industry only if players help them with jobs in their firms over the winter months. We can capitalize on the fact that the work is more healthful than indoors. The character of course superintendents is important to hold laborers, giving no special favors, and posting them on club politics. It is up to us to make conditions right for our men, to avert trouble. Outside labor leader interference will cause many clubs to close, or increase use of machinery, with smaller and higher paid crews."

Ed. J. Casey of N. Y. C. Metro. district discussed maintenance section systems. Although section system may call for extra equipment, it renders great saving in time and money, inasmuch as time is the limiting factor. A decent section shanty need not be hidden. Can be utilized for player convenience also. In case of fire, if one central shed burns, all tools are lost, while there is less risk on this if tools are in sections.

Cites Value of Greens Courses

Roland H. Verbeck, director of Short Courses, presented the certificates of merit to the students. He mentioned that 240 enrollments were made up to this year by 183 men, many of whom also took the advanced courses. While a ten week course costs about \$200, these men realize a net personal return of at least \$1,000 per year thereafter. He brought out the fact that one man who took the courses gleaned information from one conference only that saved his club \$2,200 in one year. This is an important factor, emphasizing the fact that clubs are benefitted

by underwriting professional improvement of their superintendents! This stamps as false the saying that the course is turning out unqualified men.

Gives Lecture on Canvas Hose Watering

Professor Lawrence S. Dickinson discussed the Hawthorne Valley CC fairway water system. Porous canvas hose is used to irrigate strips 300 feet long by 20 feet wide. Under low pressure, irrigation is placed where and as needed by a man who keeps moving the hose. Water and root penetration is good and deep but soil porosity and ability to take a large amount of water in a short time is an important factor. One man waters 18 fairways in five days. Water is applied on the average of once every three weeks during the dry season.

Dr. Geo. B. McClure, of Ohio State university, gave a technical pair of addresses on the behavior of fertilizers in soils. Movement downward of the chemicals to the roots depends largely on irrigation, often to the extent of flooding that gives adverse results. He stressed the importance of getting fertilizers down in the root feeding zone.

J. N. Everson recommended applying water with common sense, regardless of whatever means was used; the ideal condition is when the soil has 50% of its full water-holding capacity.

Dr. W. S. Eisenmenger, Mass. State college spoke on the effect of poisons applied to soil for insect or fungus control. Another Mr. Baker spoke on archery golf, the fall and winter being best time to participate. Equipment need not cost over \$200 for 18 holes.

Clinton K. Bradley gave a war correspondent's account of the Brown Patch Battle. He kidded all participants, warned of the greater danger of brain patch than brown patch, and showed how \$375 was saved for other needs by a single investment of a temperature recorder costing one tenth this amount.

Robert Trent Jones, of the firm Thompson & Jones, gave two talks on golf architecture. He stressed the mutual responsibility of the architect and the golf superintendent, said the better golfer plays to the pin regardless of location, the less skilled player shoots for the green and then putts out.

James B. Gill of the Buckner Irrigation Co., in his talk on the mechanics of irrigation, said the best system in the world did

not include the brains to operate it. The superintendent's judgment on the operation and use is very important. He cautioned to go after results, and not make a toy of sprinklers by using them too often. Each course is a distinct and separate problem, and the course determines the system design. Proper system design keeps down initial and future costs.

R. W. Speiser of the Worcester Lawn Mower Co., spoke on codes of ethics. Dr. DeFrance of R. I. State college advised that the 14276 strain of grass is now accepted and named "Piper Velvet Bent", in honor of the deceased man who did early turf research work. Dr. Erwin of the same connection spoke on pink patch turf disease.

Jack Gormley, professional at Wolferts Roost CC, Albany, N. Y., read a soul-inspiring paper on "Greenkeeper" recognition.

NAME of the National Association of Greenkeepers has been changed to the American Greenkeepers' Society, effective in 1938. Dues of the organization were raised to the former rate of \$10 a year.

Change of name and the dues increase were subjects of lively debate at the Washington convention but were approved by a substantial majority.

The former dues income together with profits of the annual convention sale of exhibition space barely permitted the organization to get by. With increasing demands for organization activity and an expanding field of recognition and service, it was decided that the \$10 annual dues would be acceptable to the many greenkeepers who have found affiliation with the group a profitable move, as well as to those contemplating joining.

ALMOST 30 years ago a New York newspaper man gave a young Scot, who had just landed to take his first pro job in the States, brief but comprehensive advice that can't be beaten as a tip to young pros today.

Said the journalist to the Scotch laddie: "When you get that job do everything you can to make yourself indispensable to the club." The kid who took the advice was Jack Mackie. Mackie now is in his 20th year at Inwood CC. He held two other pro jobs prior to his Inwood connection.

The journalist who gave Mackie that advice was P. C. Pulver, veteran golf writer and editor of the PGA magazine.

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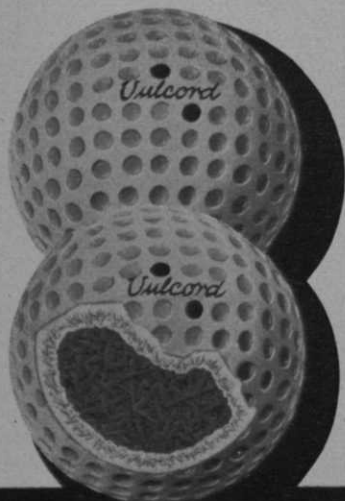
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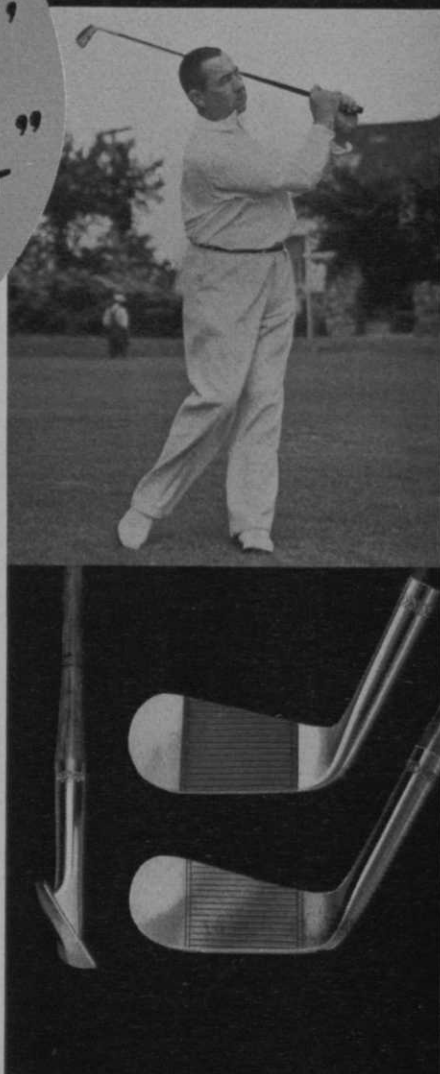
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With 1936 his first year of pushing apparel sales, Dave Tosh (Sunset Ridge CC, Chicago) is all set to make sportswear yield a nice profit in 1937.

APPAREL PAYS!

By FRED NEWMAN

Jackman Sportswear Co.

GOLF professionals who have made it their serious business to promote the sale of golf apparel have proved that their efforts pay real dividends. They have also discovered that an increase in the sale of sportswear automatically increases the sale of other golf equipment in the pro-shop for the simple reason that members buy more frequently and get more into the habit of patronizing their pro. Many pros throughout the country have built their sportswear sales to a volume which compares favorably with balls and clubs. While not yet true, generally, this trend indicates that one of the biggest opportunities for greater income among the vast majority of pros lies in the increased sale of golf apparel. The business is there for the average pro if he will go after it.

Some pros have difficult obstacles to overcome in promoting apparel sales. The first essential is an attractive, well laid out shop with at least one case for display. A common complaint is that certain members in the haberdashery business object to the pro's selling of golf apparel.

This attitude is often imaginary and can be overcome. It is unfair to the pro and to the members, for the pro has as much right to sell sportswear as he does balls, clubs and bags—so long as he is rendering a service to his members. After all, the golf professional is in business for himself to supply a convenient, expert service to members and the sale of sportswear is a department from which he derives his income, along with the sale of equipment, lessons, and income from other concessions. In other words, if the pro is desirous of increasing his income through golfwear sales, he must first of all approach the opportunity with an eager, open mind.

This opportunity varies with the size and type of the club, the facilities for pro-shop display, the location of the shop in relation to the locker-rooms and the