

Fertilizer Solution Use in Turf Maintenance

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In some respects the use of fertilizer solutions can be regarded as a recent innovation, especially on golf courses, however the practice of using fertilizer solutions is not a new one. Our ancestors used fertilizer solutions years ago in applying liquid manures to growing crops. In some parts of the world, notably in some Asiatic countries, the use of liquid manures is a common practice.

Although the practice may be new to some of us it has been with us for generations and it can be safely assumed it is here to stay. With this view in mind it seems that the subject of fertilizer solutions would bear some importance for a discussion on some of its advantages and disadvantages and how it compares with other methods of fertilization.

The factors that influence the selection and use of different types of fertilizers are many and space does not permit us to outline them all here. We can consider a few of the outstanding factors; namely, the effect of the fertilizer on growth of the plant and cost of the fertilizer. The effect on growth of the plant is greatly influenced by the type and availability of the plant nutrients contained in the fertilizer and the rate at which these nutrients become available to the plant. On the item of cost, we can consider cost of the materials and the cost of application. Many other factors must be considered if we wish to determine whether to use a dry or liquid fertilizer exclusively. Much research and experimental work is necessary and it is doubtful that a conclusion on that subject could ever be reached. This discussion then shall be limited to the use of fertilizer solutions in conjunction with our other methods of fertilization.

Weigh Claims of Use

Many claims have been made as to excellent results obtained from the use of fertilizer solutions and the advantages of solutions over dry applications. Some of these claims should no doubt be subjected to some analysis and investigation.

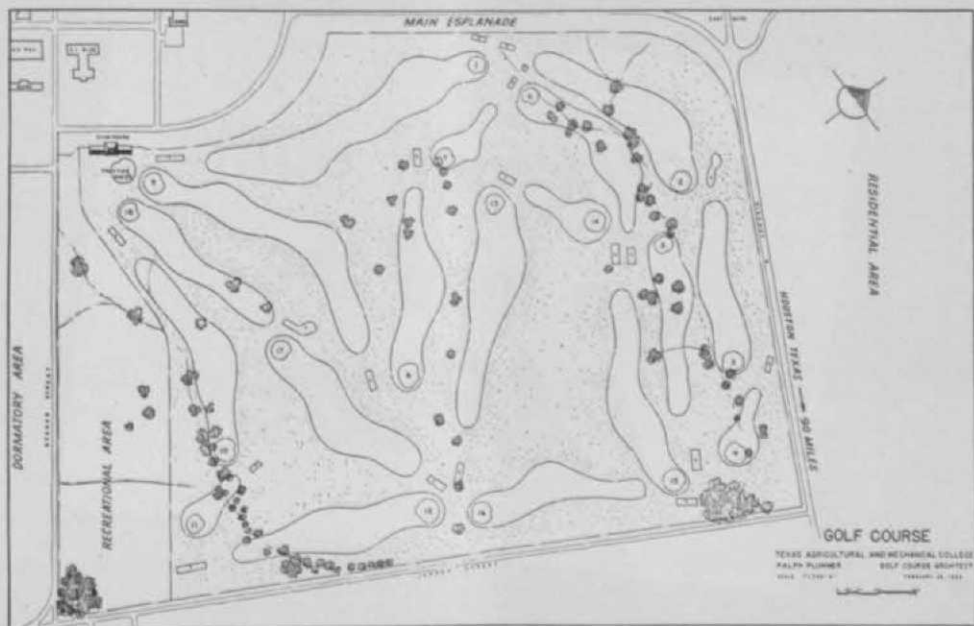
Many greenkeepers have used fertilizer solutions with satisfactory results especially during summer months. Some of us find that during abnormal weather condi-

tions it becomes rather difficult to control the rate of growth of our putting green turf with water insoluble fertilizers. The availability of plant nutrients from water insoluble fertilizers is mostly dependent on bacterial action in the soil. Bacterial action is influenced by soil, temperature and moisture conditions. We can partly control soil and moisture conditions, but we cannot very well control temperatures in our putting green soils. Under these conditions we may find it more convenient to control growth with readily available water soluble nutrient materials. Water soluble plant nutrients can be applied either in dry form or in solution whichever method we find to be more convenient and economical.

Let us bear in mind that any water soluble nutrient salt when applied dry, readily forms a fertilizer solution when it combines with water either in the soil or on the surface. Then it would seem that all other factors being equal, the same plant foods could be applied either in dry form or in solution with no difference in effect on plant growth. On this basis then, for materials that can be conveniently applied either way we have to consider only the factors of convenience and cost of application in choosing the method to apply them.

Preventing Fertilizer Burning

Most water soluble salts have a "burning" effect on plant foliage and turf grasses when applied dry and allowed to remain on the leaves or blades a certain length of time especially if there is some moisture present on the leaf surface. Extreme care and expert workmanship is essential in the application of these salts to avoid injury to turf. These salts must be washed off the blades of grasses very soon after application or brushed off by mechanical means. The factors involved in the use of water soluble nutrient salts also apply to the so-called chemical fertilizers as chemical fertilizers contain a high percentage of water soluble salts. In many cases only small quantities of water soluble fertilizers are needed to provide the amount of plant food required and it becomes necessary to increase their bulk by mixing them with sand or compost to



TEXAS A & M COLLEGE COMPLETING COURSE

Agricultural and Mechanical College of Texas will have its 6,800 yd. course, designed by Ralph Plummer, completed this fall. Plummer is supervising construction of the attractive and testing course. Par will be 71. Two winding creeks and about 50 traps are used in providing interesting hazards on the course which will serve the 3,000 Texas A&M students in the dormitories adjacent to the course and the rest of the 7,000 student body living elsewhere on the campus within easy walking distance of the new layout. Working with Plummer on the job are Dr. R. C. Potts and A. W. Crain, resident members of the Texas Turf Assn., and J. C. Fagen, mgr. of the course. Potts and Crain will conduct research on course turf. Fairways and greens are Bermuda. A fine strain to approximate bent putting conditions is being sought. The course is completely watered. In addition to the Texas A&M Open championship for the school's students, program for the course includes an intra-mural competition involving 800 team members, Southwest Conference events, Texas annual High School championship and a heavy volume of individual play and instruction. The USGA also is to be invited to play its Junior Amateur championship on the new course and it is hoped to have the National Intercollegiate played on the course.

obtain better distribution over the turfed areas. These factors all influence the cost of application.

Fertilizer solutions can be prepared so that the solution will not have any burning effect on the turf, applied with power spraying equipment and not necessarily watered in immediately after application. Fertilizer solutions can also be applied in combination with many turf fungicides and insecticides. With this method there is a great saving of labor, consequently a lower cost of application.

Fertilizer solutions may be prepared by many methods. Any water soluble fertilizer can be applied in solution, but for solutions to be applied with spray equipment we are limited to use only fertilizers that are clear and free as possible of insoluble matter that may clog strainers and spray nozzles.

Solutions supplying nitrogen alone can easily be prepared by dissolving in water proper amounts of ammonium sulphate, ammonium nitrate or urea. Solutions with the three primary elements will include proportionate amounts of water soluble phosphate and potash salts. The subject of preparing solutions is by itself a lengthy one. Probably the simplest method of preparing solutions is by diluting in water any prepared and commercially available concentrated fertilizer solution or by dissolving a prepared mixture of water soluble salts formulated specifically for making solutions. It is advisable to follow manufacturer's instructions on rate of dilution of these materials if one is not thoroughly acquainted with their use. Application of the dilute solutions can be made at rates recommended by the manufacturer or at rates determined by the

(Continued on page 63)

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the age requirement to nine next year which will give the youngsters an even earlier start in the game.

If the program is a success in LaPorte, a city of 17,000, it should be a success in larger cities. The combination of play on a municipal and private course was not hard to establish since Boyd is an Elk. The program has the backing of local people and schools because it is open to all youngsters regardless of race, color or creed. Above all it is self-supporting—an important consideration in these days of high prices.

FERTILIZER SOLUTION

(Continued from page 33)

greenkeeper, based on amount of plant food required to obtain growth results desired. This can be calculated by simple arithmetic.

Fertilizer in Terms of Weight

Being accustomed to handling dry fertilizers by unit of weight it may become confusing when we start dealing in terms of quarts, gallons and barrels. Thinking in terms of liquid measure we may lose track of our old friend—The Unit of Plant Food. One simple solution to this problem is to disregard the liquid measure and continue to think in terms of weight,

which is still the only official and practical method of specifying quantities of fertilizers whether they are in gas, liquid or solid form. The water in fertilizer solutions is only used as a carrier of our old friend—The Unit of Plant Food. The approximate weight of one gallon of a 20 unit concentrated fertilizer solution such as a 10-6-4 or 5-10-5, is 10 pounds. If we dilute one gallon of a 10-6-4 solution in 50 gallons of water we are mixing 10 pounds of 10-6-4 fertilizer in 400 pounds of water. The matter then becomes simplified to determine the rate of application of the diluted solution. If we wish to make an application of 2 pounds of 10-6-4 fertilizer per 1000 sq. ft., the 10 pounds of fertilizer in the 50 gallons of water will be applied on 5000 sq. ft. of turf, at rate of 10 gallons per 1000 sq. ft. This will give us an application of .2 lb. of nitrogen, .12 lb. of phosphoric acid and .08 lb. of potash per 1000 sq. ft. A rather light application but in most cases sufficient during summer months.

We must always bear in mind that the plant food in fertilizer solutions is quickly available to plants. Where we would normally apply $\frac{1}{2}$ lb. of nitrogen per 1000 sq. ft. and this nitrogen is derived from a fertilizer containing a substantial amount of water insoluble organics then it would

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be advisable when applying fertilizer solutions to limit the nitrogen to about one-half that amount or $\frac{1}{4}$ lb. per 1000 sq. ft. The other $\frac{1}{4}$ lb. can be applied later as needed.

Calculating Dilute Solutions

Sometimes it becomes necessary to know the analysis of the dilute solutions we use, to determine a safe concentration that can be applied to turf without injury. This can be easily calculated as by following example. We shall dilute 1 gallon of concentrated solution analyzing 10-6-4 in 50 gallons of water. Converting liquid measure to weight, we have 10 lbs. of 10-6-4 fertilizer or 1 lb. N, .6 lb. P_2O_5 , and .4 lb. K_2O in 400 lbs. of water. One lb. N is .25% of 400, .6 lb. P_2O_5 is .15% of 400 and .4 lb. of K_2O is .1% of 400. So the analysis of the solution would be .25-.15-.1. Knowing the safe strength of a solution that can be applied to turf without injury we can calculate the amount of water soluble fertilizers or concentrated solutions to add to any quantity of water by knowing the analysis of the materials. For instance, it has been observed that a solution of sulphate of ammonia analyzing .25-0-0 has a burning effect on turf if applied during hot weather. A solution of urea of same strength can be applied

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to turf anytime without injury. Urea solutions of .45-0-0 have been used during summer months in combination with mercurial fungicides without any turf injury, however it is safer to stay below this figure.

One disadvantage of fertilizer solutions is the relatively high cost of materials prepared specially for solutions. One of the reasons for the higher cost of solution materials is that technically clean chemicals are used in their formulation to make solutions free of insoluble impurities. In cases the higher cost of solutions can be offset by the saving on cost of application, especially when only light applications of plant food are needed. The greenkeeper can ascertain what the comparative costs of fertilizer applications are in using either solutions or dry applications by comparing costs of materials and expenditures in labor in applying them.

Fertilizer solutions may some day have an important role in our turf fertilization programs but as it appears now their use will be limited; one reason being that water insoluble organic fertilizers, well recognized as being essential to the production of fine turf, cannot be applied in solution.

The use of fertilizer solutions in turf

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maintenance is a field that should warrant more study and experimental work from our Experiment Stations, especially in how the more soluble phosphate compounds used in solutions compare with the calcium phosphates commonly used in dry fertilizers in phosphorus availability and phosphate fixation in soils. Also more study could be given to developing more efficient and economical ways of preparing solutions as it is apparent there are great labor saving possibilities in the use of solutions.

NEWS from the MANUFACTURERS

TO ED SULLIVAN FROM WALTER HAGEN



Ed Sullivan (left), newspaper columnist and star of the television show, "Toast of the Town," receives a set of golf clubs from Walter Hagen (right), during a recent visit to Detroit. In the center is Benson Ford, vice-president of Ford Motor Company and general manager of the Lincoln-Mercury Division. The clubs were the gift of the Detroit Lincoln-Mercury dealers and were presented to Mr. Sullivan at a dinner given in his honor during his visit to Detroit.

WALL SHOOT'S 30th ACE

Arthur Wall, Jr., asst. to Tom Kerrigan at Siwanoy CC, Bronxville, N.Y., holed his 30th ace, July 18 on Siwanoy's 197-yd. third. Wall hit the shot with a Bristol No. 4 iron. The same round he was 4 inches from the 183 yd. 13th with his tee shot. The 28-year-old sharpshooter won the national intercollegiate driving championship in 1948 with bangs of 290, 288 and 278 yds. He was capt. of Duke university's golf team in 1949, the year of his graduation. He's won two Penn State amateur titles, the Pan-American Open and three times was runner-up in the Southern Conference

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