TIMELY TURF TOPICS

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CHEMICAL NITROGEN NOT TO BE USED ON TURF: According to War Production Board Conservation Order Number M-231, which became effective September 12, 1942, "No fertilizer manufacturer, dealer or agent shall deliver any chemical fertilizer containing chemical nitrogen for use on lawns, golf courses, parks, cemeteries, roadsides or noncommercial plantings of trees, shrubs or flowers, and no person including fertilizer manufacturers, dealers and agents, shall use any chemical fertilizer containing chemical nitrogen for any of such purposes." This order of course was necessitated by the fact that "the fulfillment of requirements for the defense of the United States has created a shortage in the supply of chemical nitrogen for defense, for private account and for export."

According to this order, therefore, not only can chemical nitrogen not be sold for use on turf but it can not be used on turf even by those who already have on hand supplies of nitrogen-containing fertilizers. Those who have on hand supplies of fertilizer containing chemical nitrogen which they are holding for use on turf are urged to sell it either directly to the farmers for use on crops or back to the company from which the materials were purchased. This order holds only for those materials which contain chemical nitrogen. There are no restrictions on natural organic sources of nitrogen, superphosphate, muriate of potash, or any other fertilizer materials.

CENTIPEDE GRASS: Numerous inquiries concerning the general usefulness of centipede grass (Eremochloa ophiuroides) for turf purposes have been coming in from various sections of the South and from even as far north as the District of Columbia. As the inquiries indicate the fact that decidedly exaggerated claims have been made for it, it seems advisable to attempt so far as possible to clarify its status as a turf grass.

Seeds of this grass were imported in 1918 and 1919 from the southern provinces of China, where it was considered the best lawn grass in the region. In this country it has proved to be a good turf grass for fairways and lawns in light, dry, sandy soil in much of Florida and along the Gulf Coast for a hundred miles inland. At Tifton, Georgia, it was reported to have withstood temperatures as low as 12°F. However, it is not likely to be hardy north of a boundary line extended from Wilmington, North Carolina, to Shreveport, Louisiana.

It is a low-growing grass which spreads rapidly by stolons which lie close to the ground and may grow from 3 to 5 feet in a single season. The leaf blades grow more or less vertically from the prostrate stolons to a height of 3 or 4 inches. Even when in flower, it is only about 6 inches tall. Stolons planted in rows 12 inches apart have been known to form a good sod in 90 days when well cared for.

The turf is sometimes killed by heavy usage and is browned by frost but is relatively resistant to brownpatch and chinch bug injury. It grows well in partial shade as well as in full sun. Its range of adaptability, however, is not so great as that of Bermuda grass, which is desirable throughout much of the South.

Seed of centipede grass is not available commercially and therefore the grass must be obtained from stolons or sod. The grass is usually sprigged (planted by stolons) at the rate of 1 square foot of good sod to 25 square feet of area to be turfed.

ORGANIC FERTILIZER FOR TURF: In the past few years only from 10 to 12 percent of all the nitrogen used in the fertilizer industry in this country came from natural organic sources. In 1941, for instance, only 51,410 tons of nitrogen out of a total of 451,308 tons came from natural organic products. In the past few months, however, a wide spread interest in the possibilities of various natural organic materials for use on turf has arisen as a result of the fact that the War Production Board is not permitting the use of chemical nitrogen on turf other than that on military airfields.

In view of this interest, therefore, the following table has been compiled with the assistance of Mr. A. L. Mehring of the U. S. Department of Agriculture. In the table are included many of the most widely available natural organic sources of nitrogen. The approximate average analyses are also listed. It should be remembered that the natural products vary sometimes in their mineral composition over a wide range. For instance, dried blood may vary in nitrogen content from a minimum analysis of 6 percent to a maximum analysis of 14 percent. The bone meals vary from 0.7 percent of nitrogen to 5.3 percent and from 17.0 percent of phosphoric acid to 30.0 percent. However, these figures will serve to give our readers an idea of what they can expect on an average in the way of plant foods from these materials.

These materials are in one form or another byproducts of living things. No one product is produced in all sections of the country. Therefore there is included in the table a column which gives the section of the country where such material is chiefly produced. This does not mean that these are the only sections of the country in which these materials are produced but only serves as an indication as to where the largest amounts are produced. The reason for including this information is two-fold. In the first place the cost will be less if the freight is less and therefore your club will profit if you can use materials which are produced in your section of the country. In the second place in the interest of our war effort we are urged not to make any more demands on our transportation facilities than are absolutely necessary.

Organic Material	Approximate Average Analysis			Chief Production Area
	Nitrogen (N) Per cent	Phosphoric acid (P_2O_5) Per cent	Potash (K_2O) Per cent	
Cottonseed Meal	6.5	2.3	1.8	South
Soybean Meal	7.0	1.5	2.5	Midwest
Linseed Meal	6.0	1.8	1.5	Northwest
Peanut Meal	7.0	1.5	1.2	South
Milorganite	6.0	2.5	-- *	Midwest
Chicagrow	5.0	3.0	--	Midwest
Hu-Actinite	5.0	2.8	--	South Central
Nitroganic	6.0	2.5	--	California
Raw Bone	4.0	22.0	--	Midwest
Steamed Bone	2.5	27.0	--	Midwest
Dried Blood	12.0	2.0	--	Midwest
Animal Tankage	8.0	10.0	--	Midwest
Process Tankage	9.0	--	--	East
Fish Scrap	9.0	7.0	--	All Coasts
Dried Poultry Manure	5.0	2.5	1.3	Atlantic Coast
Dried Sheep Manure	2.0	1.5	3.0	Atlantic Coast
Dried Cattle Manure	2.0	1.5	2.5	Atlantic Coast
Castor Pomace	5.5	2.5	1.0	East
Cocoa Shells	2.5	1.5	2.5	East

*Less than 1 percent is not considered appreciable and is indicated by --.

It should be remembered that many animal and plant waste products are produced on a small scale in almost all sections of the country. These materials can not of course be included in this table. However, if such materials are available in your immediate vicinity it would be wise to study the possibilities which they may have for use as fertilizer on your turf. Small test plots (10x10 feet) on your own turf will give you an indication of what you can expect from them. Such test plots should be accompanied by other plots which have been fertilized with materials the results of which you recognize as being satisfactory under your conditions. The value of testing such locally available natural sources of nitrogen in this time of emergency cannot be overemphasized.

In considering the possibility of using organic fertilizers on large turfed areas another question which naturally arises is their commercial availability. Of course it is impossible to predict with certainty what will be available next year. Estimates are available as to the quantities of these materials used as fertilizers in 1941. A table is therefore included herewith in which related materials are grouped together and a figure given which indicates in round numbers the amounts which were sold for fertilizer purposes in 1941. Some of the factors which may possibly influence the availability of various groups of these materials next year are discussed in the paragraphs which follow.

Organic Material	Approximate Tonnage Used as Fertilizer in 1941
Cottonseed Meal	145,000
Other Seed Meals	7,500
Activated Sewage Sludge	120,000
Bone Meal	37,500
Dried Blood	8,300
Animal Tankage	50,000
Process Tankage	100,000
Fish Scrap	44,500
Dried Animal Manures	16,700
Castor Pomace	82,000
Cocoa Byproducts	36,000

Generally speaking the oil seed meals seem to offer the most promising supply of nitrogen fertilizer. Because of the increased demand for the oils it has been estimated that there will be from one to one-and-a-half million tons more of the four leading oil seed meals -- peanut, linseed, cottonseed, and soybean meals -- than ever before. It is also estimated that one million tons of these excess meals will be used for feed purposes, leaving approximately 500,000 tons for fertilizer over and above the tonnage which has been used in the past for fertilizers. However, since the supply of chemical nitrogen is short, fertilizer manufacturers will probably use more natural organic materials in making commercial mixtures.

Blood, animal tankage, and bone meal are all possible sources of organic fertilizers for turf purposes, the former two being particularly good nitrogen sources. However, in the past relatively large amounts of these materials used in this country have been imported from South American countries, Australia, New Zealand, Canada, and Cuba. Since these importations are likely to be greatly reduced these materials may not be so readily available on the market except in areas near large abattoirs. For instance, in 1940 over 11,000 long tons of dried blood were imported from Uruguay, Brazil, and Argentina, and over 12,000 long tons of animal tankage were brought in from Argentina, Canada, and Cuba.

Such materials as dried blood, fish scrap, and animal tankage are also required for feed purposes, so the supply of these materials for direct fertilizer use may be reduced except where local supplies are available. So far as dried activated sludge is concerned there are four commercial products on the market. Milorganite is the product manufactured by the Milwaukee Sewerage Commission and commonly used on many of the golf courses and lawns in all parts of the country. Chicagrow is manufactured in Chicago; Hu-Actinite in Houston, Texas; and Nitroganic in Pasadena, California.

MILKY WHITE DISEASE OF JAPANESE BEETLE GRUBS: Arsenate of lead is still available for use on turf. The uncertainty of the future, however, has resulted in an increased interest in the control of the Japanese beetle by means of the milky white disease of the grubs. This disease and its potentialities in the protection of turf from the ravages of the grubs were fully discussed in the November, 1940, issue of TURF CULTURE.

As stated at that time, the milky white disease is caused by bacteria which grow and produce spores in large numbers in the blood of living grubs. It is the spores which give the blood of living grubs its characteristic milky appearance which has been responsible for the common name given to the disease. As many as 20 billion spores have been found in the blood of a single grub. Diseased grubs soon disintegrate and the spores are liberated into the soils.

The spores are remarkably resistant to unfavorable conditions such as excessive moisture or drought, excessively high or low temperatures, or the digestive juices of birds or animals. Once present in the soil, they remain dormant but alive for long periods of time and are ready to infect and seriously reduce any subsequent broods of the grubs. Obviously since one diseased grub may contain billions of spores, the disease is spread rapidly and efficiently by means of the grubs. Birds which eat diseased grubs are not themselves affected, but, since the spores are not injured in passing through the intestinal tracts, the birds aid in spreading the disease. The bacteria are harmless to men and other animals.

There are two milky diseases which the Department of Agriculture scientists refer to as types A and B. These bacteria have been found to occur naturally in the soil but usually not in sufficient numbers to control the beetles effectively. The investigators in the Bureau of Entomology and Plant Quarantine of the U. S. Department of Agriculture have developed a practical method of culturing the bacteria in the bodies of Japanese beetle grubs, and using the dead bodies which are ground and mixed with talc, for inoculating new areas. They expect that the introduction of the disease may prevent beetles in new locations from becoming as numerous as in older infestations. They say, however, that "it cannot be counted on to eliminate the Japanese beetle entirely, or to prevent spread to new locations."

The distribution of the disease is being carried on in beetle infested areas by the Department of Agriculture with the cooperation of the state experiment stations in Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, and Virginia. As yet no diseased material is available commercially nor distributed through private agencies. If you are interested in having the disease established on your course, and you are located in one of the above mentioned states it might be well for you to contact the entomologists in your State Agricultural Experiment Station.

SEARCH FOR SCRAP: If you have not already done so, be sure to spend the next rainy day on a search of the sheds and out-of-the-way places for old worn-out machinery and parts. Now is the time to clean out all the hidden corners and give or sell all useful scrap materials to the salvage collectors. Both your country and your club are certain to profit from the effort.

AVAILABILITY OF ARSENICALS: Neither sodium arsenite nor arsenic acid is to be available for use in weed control next year. As yet there are no restrictions on the sale of arsenate of lead, so it may still be purchased and applied to turf.

A list of the various crop plants has been prepared, however, in which an attempt has been made to arrange them in the order of importance in the war effort. On this list, turf grasses for golf courses, lawns, parks, etc., naturally are at the bottom, since food crops must of course be given right-of-way for all materials of which there is a shortage. If and when restrictions for the use of arsenate of lead should be imposed, the turf grasses therefore may be expected to be among the first to feel them.

ESTIMATED CROPS OF SEED OF TURF GRASSES FOR 1942: According to the Agricultural Marketing Service, the crop of Kentucky bluegrass seed for 1942 in this country is the largest on record. The estimate now is that there will be at least 50,400,000 pounds of rough cured seed as compared with 47,740,000 pounds last year or an average annual production of 36,820,000 pounds over the 5-year period from 1936 to 1940, inclusive. The redtop seed crop, although 10 percent less than last year's record production of 13,800,000 pounds, is nevertheless considered to be abundant. With the increased demand for seed of turf grasses associated with the turfing of airfields, army posts, defense housing projects, road shoulders along defense highways, etc., it is fortunate indeed that the production of seed of these grasses this year has been so satisfactory.

Other turf grasses for which estimates of this year's crop are available are included in the following table along with Kentucky bluegrass and redtop. The estimated number of pounds of rough cured seed to be harvested in 1942 is given for each year. The grasses are arranged in the order of the amount of seed produced.

Kentucky bluegrass	50,400,000	pounds
Domestic ryegrass	32,800,000	"
Redtop	12,450,000	"
Perennial ryegrass	2,800,000	"
Bermuda grass	1,500,000	"
Chewings' fescue	420,000	"
Red fescue	200,000	"
Bahia grass	12,000	"

Estimates for the size of the crop of bent grass seed as well as others which might be of interest are not now available.

TETRAMETHYL THIURAMDISULFIDE ACCLAIMED AS GOOD MERCURY SUBSTITUTE: Satisfactory control of both dollarspot and brownpatch with tetramethyl thiuramdisulfide (the active ingredient of Thiosan) during 1942 has been reported from various parts of the country. In Iowa, for instance, various greenkeepers report excellent control of both diseases with it, with no injury to the grass even when the greens were wet with dew at the time of application. On the course at Iowa State College, one-half of each green was sprayed with Special Semesan and the other half with Thiosan at rates of 1, 1½, and 2 pounds to 6,000 square feet. Brownpatch was controlled equally well by Thiosan at all three rates, and in all cases the control was equal to that obtained with Special Semesan. Dollarspot also prevailed on that course this season and Thiosan cleared it up whereas Special Semesan failed to control it satisfactorily.

The results from Iowa have been quoted because large scale comparisons with a mercury fungicide were made, and information was available regarding rates of application used. Wherever we have heard of results from the large scale use of this material during 1942, satisfactory control with no injury to the grass has been reported. These results substantiate those obtained by the Green Section staff in 1940 and 1941 from many tests made with tetramethyl thiuramdisulfide as one of a large number of possible mercury substitutes.

EARTH MOUNDS OF SOUTHERN GREEN JUNE BEETLES TROUBLESOME ON TURF: In late summer and early fall the grubs of the southern green June beetle are likely to become troublesome on turf, particularly on golf greens, in the Southern States and as far north as the southern sections of Pennsylvania, Ohio, Indiana, and Illinois. Their presence is first evidenced by the large unsightly mounds of earth which they throw up onto the turf at the mouths of their burrows. These mounds may be as large as 3 inches in diameter and the openings of the burrows are much larger than those of earthworms.

The grubs do not feed on the grass roots but rather on the organic matter in the soil. They, therefore, do not injure the grass directly. Because of the large size of the burrows, however, they may cause the soil to become so porous that evaporation is increased seriously and the grass injured from lack of moisture. Also, newly seeded turf may be uprooted by the extensive burrowing. More usually, however, the grass under the mounds is killed when the soil becomes packed solidly into closely cut turf as a result of crushing the mounds either by trampling or by mowing machines.

The grubs are readily recognized because of their large size and the fact that the grubs crawl on their back with the aid of bristly hairs. They may be nearly 2 inches long and are fatter than the grubs of the May beetles. Unlike many of the other grubs which are pests in turf, they complete their life-cycle in one year. In the fall, the grubs which have hatched in August dig deep burrows in which they hibernate. By the latter part of May they are fully grown and pupate. They emerge as large velvety green beetles early in July. In this stage they frequently feed on fruit, especially figs, grapes, and peaches. The eggs are laid in the soil by the adult beetles and 3 weeks later the young grubs hatch and come to the surface of the soil.

According to the U. S. Department of Agriculture, the grubs become evident by the middle of August and are more easily killed then than later in the fall when they go down deeper in the soil. However, injury to the turf is likely to be most severe in the fall when they dig their deep burrows. Since the grubs feed on the organic matter in the soil no animal manure should be used where they are a problem. However, because of their feeding on the soil rather than on the plants they may be effectively controlled with an application of arsenate of lead. The Department of Agriculture recommends applications at the rate of 10 pounds to 1,000 square feet.

Should arsenate of lead cease to be available the more tedious method of injecting carbon bisulfide into the burrows may be used. Carbon bisulfide, however, injures grass if applied to the surface. Therefore extreme caution should be used in applying it. It can be conveniently applied with a long-spouted oil can, by means of which 1 teaspoonful should be injected deeply into each burrow. The burrow should then be plugged with soil to prevent escape of the fumes. Since carbon bisulfide is inflammable, extreme caution should be used to keep it away from any fire while handling it. Workmen should be strictly forbidden to smoke while applying it or while near anyone who is using it.

Since the grubs come out of their burrows on damp nights and crawl on the surface, perhaps the simplest method of control on the golf green or lawn is to go out at night or early in the morning and sweep them off the turf.

KEEP BOLTS TIGHT: Conservation, of necessity, must be the keynote to the maintenance of turf on golf courses, parks, and home lawns throughout the emergency. In the interest of conservation, an all-out effort should be made to keep all usable machinery in the best possible condition for the longest time. Tightening bolts at frequent intervals should be included in any such effort. Lock washers will be useful in keeping them tight but if they are not available you might try coating the end which protrudes beyond the nut with thick paint or varnish.