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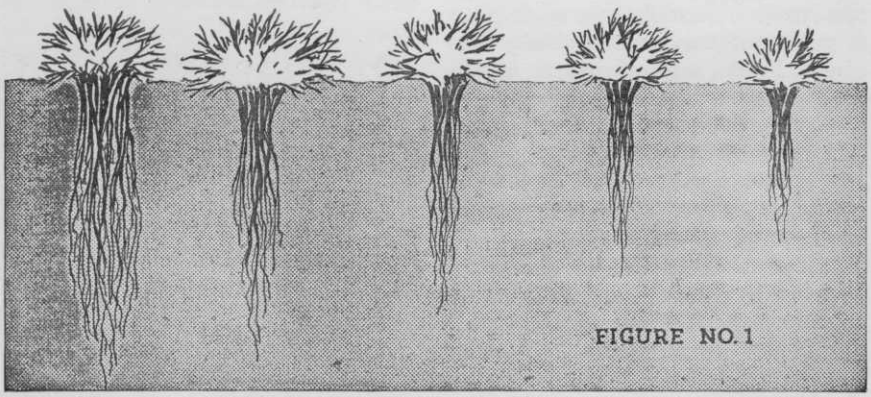
GOOD LAWNS IN THE SHADE

SOME of the problems of growing grass in shade were discussed in *Lawn Care* last year. We pointed out in detail the contributing difficulties and made some suggestions. In reviewing the matter here we are attempting to give as specific directions as possible.

Compared to the open fields of the country the average lawn presents such an unnatural environment that it is surprising grass grows at all. Most lawn soils are either too wet or too dry. They are usually deficient in plant food and often contain poisonous salts that are toxic to grass. Sometimes grass is subject to constant tramping and the ill effect of an atmosphere laden with smoke, soot and harmful chemical fumes. In many cases shade from trees or buildings is added to these unfavorable conditions.

A moderate amount of shade may be beneficial if it protects the closely cut grass from the hot midday sun. But where a lawn is densely shaded all day or during a greater part of the day, a real difficulty is encountered. If it is shaded only in the afternoon the effect will be less harmful than where it is shaded in the forenoon and later suddenly exposed to full sunshine with its high temperature and conditions favorable to rapid evaporation. In this latter case grass may wilt rapidly when the sun strikes it



Effect of Shade on Root Growth

Actual weight of grass roots, reading from left to right: (1) sun all day, 44 grams; (2) afternoon shade only, 18 grams; (3) forenoon shade only, 14 grams; (4) speckled shade, 7 grams; (5) shade all day, 3 grams. U. S. G. A. Green Section Bulletin Vol. 13, No. 5.

because the breathing pores do not quickly close. As a result the leaves transpire moisture faster than it can be supplied by the roots.

In analyzing the shade problem we find that some difficulties can be controlled and that some can not. In general, the amount and intensity of sunlight is beyond modification except in a limited way such as by the removal of some tree branches causing the shade. Tree roots and grass roots are quite competitive in their efforts to obtain food and moisture. Another difficulty is that rainfall tends to collect on tree limbs and fall as large drops which wash soil away from grass roots exposing them to the weather. In the winter months when alternate freezing and thawing is apt to kill them, this is particularly harmful.

Some of the difficulties that could be controlled yet account for many shaded lawn failures include: shortage of plant nutrients, too much or too little moisture, and unfavorable bacterial environment. All of these may be due to a poor mechanical or chemical soil condition.

Limited Root Growth

Apparently the main effect of most of these controllable and uncontrollable factors is to limit the root system. As the root system is diminished the whole plant is weakened, until it may finally succumb. In the test referred to in figure 1, conditions for the grass were relatively favorable except for shade. If the root system of the average shaded lawn were compared with adjacent grass growing in the sun we would probably find even greater variation.

It is obvious that if we are desirous of having a good lawn in the shade it will be necessary to make conditions favorable to root growth. Some of these cannot be changed but others can and they should be as near right as possible. Thus the mechanical characteristics of the soil are of great importance. They should be such as to permit easy and rapid movement of air and moisture. This movement is retarded in heavy clay soil and is too rapid in sandy or gravelly soils. Tile drainage may correct the former while a change in the soil texture and structure may be the only solution in the latter.

Both subsoil and topsoil need to be improved chemically by adding plant food and sometimes lime. Trees should be fed so they can obtain their sustenance from the subsoil and not need to take the surface food from the grass.

1—New Lawns in Shade

If you have a shaded lawn that has always given trouble the idea of tearing it up may sound a bit terrifying. However, a new lawn may be the only practical solution. A permanent turf can be had only if conditions are right. If these are made right in the beginning a satisfying lawn will be obtained more economically than by superficial treatments from time to time.

As in building other lawns, the work on those that are shaded should be planned so that they may be seeded at the most favorable season. This is early fall in most localities. Although fall seeding may mean extra care in keeping leaves removed, the great advantage is

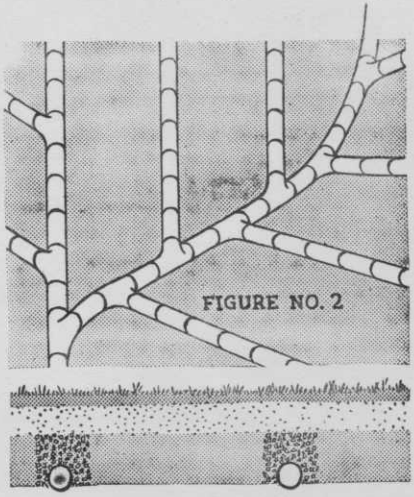


FIGURE NO. 2

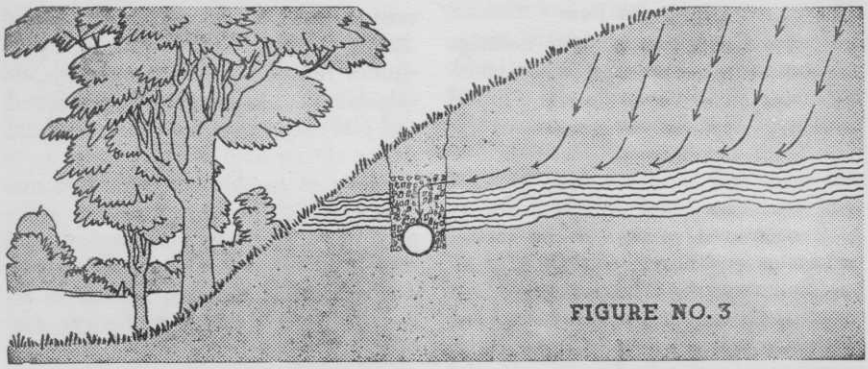


FIGURE NO. 3

that the grass gets a good start before tree leaves shut out sunlight the following spring. Spring seeded lawns are subjected to the harmful effects of shade from trees before they can develop much root growth.

Laying the Foundation

The mechanical features of soils are of utmost importance. First of all there must be facilities for the removal of excess water. In a light sandy soil natural drainage may be adequate, but in heavier soils artificial drainage is needed. If tile lines are necessary they should be installed by some one who understands this work. Except for very long lines, four inch tile is sufficiently large. Lines are usually placed 15 to 20 feet apart from 12 to 18 inches below the final surface grade. (Figure 2.) The fall should be gradual, about three inches in 100 feet, and established by using instruments, not by guesswork. It is best to cover tile lines with 8 or 10 inches of coarse cinders or gravel, to insure proper functioning and prevent soil from clogging the lines. (For further details see *Lawn Making and Maintenance,* pages 19 and 20.)

Draining the Hillsides

Turf areas on the sides of hills or slopes often need tile drainage. At first thought it would seem that surface drainage takes care of these places but that is far from true. Seepage occurs where excess water draining through the soil from higher levels is prevented from continuing its downward movement by an impervious layer of subsoil or rock. In such cases the drainage water moves horizontally along this layer until it outcrops on a down grade surface. This moisture causes harmful wet spots at or below the point of outcrop, as illustrated in the above sketch. To overcome this it is necessary to locate the stratum and then to install tile lines that will carry off the excess water before it reaches the surface of the slope. (Figure 3.) The need for artificial drainage on hillsides is many times shown by the presence of a heavy growth of moss, which ordinarily indicates a water-logged soil.

One of the most important functions of tile drainage is aëration of the soil. Removal of surplus water permits air to pass through the soil and supply oxygen to the grass roots. Drainage keeps soil friable and mellow, makes a more favorable home for friendly bacteria, and discourages moss. Practically all heavy soils would produce much better turf if they were tile drained. This is particularly true if the lawn is shaded because the absence of sunlight reduces evaporation and retards the drying process after periods of excess moisture. It is safe to assume that nearly all densely shaded lawns need underground drainage.

Fertilizing the Trees

After suitable underground drainage has been provided, the next step in building a lawn under trees is to add a liberal amount of fertilizer for the use of the trees. This can be accomplished in several ways and is independent of later applications for benefit of the grass. A good method is to remove the topsoil under the spread of the tree and thoroughly cultivate the subsoil. Mix in liberal quantities of fertilizer, being careful not to harm the tree roots. This cultivation need not extend right up to the tree trunk in so far as the fertilizer application is concerned. The feeding roots of trees are commonly found at the tips of the larger roots and so the fertilizer application is best concentrated in a zone extending from the ends of the branches to within 1½ or 2 feet from the trunk. (Figure 4.)

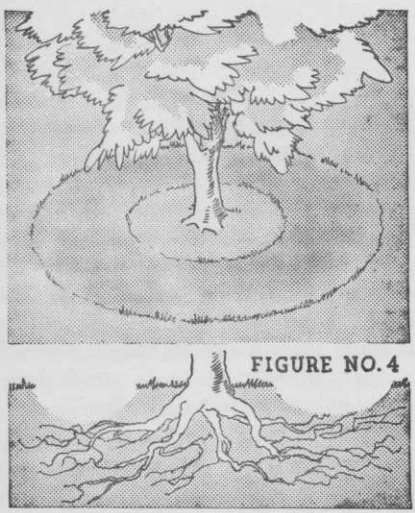


FIGURE NO. 4

It is important to have food well below the surface so that the fibrous roots will grow down to get it instead of up to take the limited supply available to the grass. If obtainable, liberal quantities of manure may be worked into the soil under the tree and the fertilizer thoroughly mixed with it. German peat moss, sewage sludge, leaf mold or any partially decayed organic matter make good substitutes for manure. Such materials are valuable for their ability to hold moisture and plant food for use of the tree roots. There are no hard and fast rules as to the kind of fertilizer to use except that it be one high in nitrogen, with smaller proportions of phosphorus and potash. Many prefer a fertilizer composed in part of organic materials because its effect is longer lasting. Authorities consider the food requirements of trees and grass to be quite similar.

The amount of fertilizer required depends upon its analysis and the spread of the tree. A good tree and grass food is one having an analysis of 10 parts nitrogen, 6 parts phosphoric acid and 4 parts potash. Forty to fifty pounds per 1000 square feet of ground area is considered a moderate quantity to use for trees. This is measured on the basis of ground area under the spread of the tree.

Providing Good Lodging

With these things done, the area can be prepared for seeding. Good topsoil is most important. It can be improved now but not after the ground is in turf. Sandy soils may be much improved by incorporating liberal quantities of decaying organic matter and clay. The heavier soils are often broken up by mixing in sand as well as organic matter. Comparatively large quantities will be needed but the investment will prove a paying one in the long run since the object is a good permanent lawn.

If existing topsoil is put back in place it is advisable to first have it tested for possible excessive acidity, particularly if moss were present or if the soil has a sour, musty odor. Sometimes lime is needed but its use is not recommended unless it has been definitely determined that it is needed and in what amount. Most of the state agricultural stations furnish analyses without charge, or we will gladly check soil samples for you. If

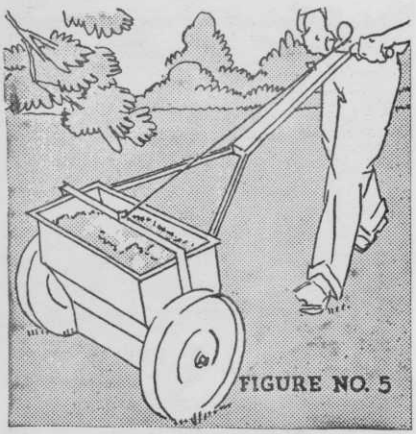


FIGURE NO. 5

the native soil is very sandy or a heavy sticky clay it is best to replace it with good topsoil.

After the topsoil has been improved physically, it should receive a heavy application of fertilizer. This is most efficiently applied with a mechanical distributor. (Figure 5.) Fifty to seventy-five pounds per 1000 square feet is not too much when using a 10-6-4 fertilizer. Recent experiments have proven the value of having a liberal supply of plant nutrients available to grass seedlings. They will develop into mature plants much faster and be better able to withstand the effect of hot, dry weather or extreme cold.

A liberal application of fertilizer to the topsoil is always necessary for tree shaded lawns, even after this has been supplied to the trees. There the grass is growing under a condition of severe competition and unfavorable environment. Every effort should be exerted to help the struggling grass plants.

More Air and Light

One thing not mentioned before in connection with the building of good lawns in the shade is the trimming of trees. Beautiful trees ought not be ruined by wholesale hacking and chopping but judicious use of the saw by someone who knows his business may improve the appearance and health of any tree and by letting in more light make conditions more favorable for grass. At the same time, it may permit better air circulation under the tree. While not often considered, this is really important. Many turf failures in the shade are due to fungus diseases killing the grass. Such diseases are more apt to appear in locations where the air is stale and stagnant.

The removal of a few tree limbs or the cutting of an opening in a surrounding dense hedge may be a great help in increasing air circulation and reducing the possibility of disease. Air movement has such an important bearing on disease control that at least one golf club in this country supplies it artificially to a putting green. Large revolving fans are operated all night during hot weather to keep the air moving because the green is located in a protected hollow where air movement is almost nil.

The Surface Grade

Following the fertilizer application the soil is ready for surface grading. Here again drainage is important. Surplus water must not stand on the lawn. Standing water is the cause of much turf kill especially during winter months. This grading should extend right up to the tree trunks so the heavy wash of water down the trunks will not collect in pools at the base of the tree. A shallow mounding of soil at the tree base will solve this problem. Sometimes a cultivated area is maintained four or five inches out from the base of the tree. This should be of fairly light soil which will permit ready absorption of water.

Seeding the New Lawn

From this point the usual instructions for seeding new lawns apply. A firm seed bed with the upper inch of soil finely pulverized is the thing. Of equal importance is selection of the seed. It must be composed of grasses that will thrive in absence of sunlight. These are avail-

able but unfortunately many shade mixtures are that in name only. They will produce a temporary green effect but nothing permanent. The right mixture of grasses for shade costs more than ordinary seed but the investment is well justified. Moreover it produces a type of turf harmonious in color and texture with the best open place grasses.

2—Improving Established Lawns

Although we think the shade problem can be permanently solved only by the foregoing procedure we realize that there are many places where this is not feasible. In those cases certain treatments can be prescribed that should result in a big improvement, to say the least. Under no circumstance should the fertilizing of the trees be omitted. This means much in getting better turf and even more to the health of trees. Authorities tell us that many trees die needlessly every year because of starvation.

Feeding Trees

There are several methods of getting fertilizer into the ground for use of trees. Some people make a business of this and have efficient equipment for doing it. It is important to place the fertilizer to a depth of about eighteen inches and to locate it near the tips of the feeding roots. With most trees these are located as far from the tree trunk as the tips of the branches. A good plan is to make holes in a pattern similar to that shown in figure 6. They can be made with a post hole digger or punch bar and should be about 18 inches apart. Place into each hole the proportionate amount of fertilizer required to give the tree the amount needed according to the suggestion on page 4. To avoid the possibility of burning it is best to mix the fertilizer with three or four times its volume of soil, peat or manure. The organic materials are to be preferred if they are available.

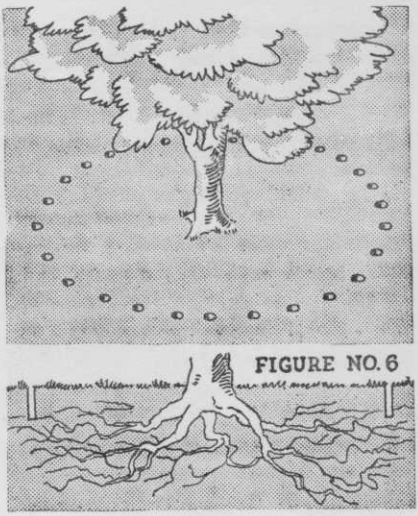


FIGURE NO. 6

The frequency of feeding trees depends upon how near to starvation they were. It is safe to say that many trees could well use fertilizer every year or two.

The next step is a vigorous scarifying of the surface soil in preparation for seeding. A heavy garden rake can be used to loosen the surface soil, remove dead grass and weeds and make a favorable seed bed. The seed will have a better chance if a layer of good soil is spread over the lawn to a depth of an inch or so. The established grass will grow up through it, while the new grass will find conditions favorable to a rapid root growth.

Whether or not topsoil is used, a heavy fertilizer application is essential. A specific grass fertilizer will give the best results, since the food requirements of turf, as well as trees, are quite different from those of flowers or vegetables.

As suggested above all efforts to make a good lawn in shade will go for naught unless the right seed is selected.

After sowing the seed evenly it should be raked into the ground or covered lightly with screened soil or pulverized peat moss. This is important as otherwise

the seed and later the seedling plant will hardly get enough moisture for germination and growth.

Ground Covers

In spite of what pains may be taken, there are certain places where permanent turf cannot be obtained. Shade may be so dense or the soil so bad that improvement is out of question. In such cases a green covering can be maintained by sowing grass seed two or three times each year with the realization that each sowing will be only temporary.

Sometimes ground cover plants are brought into use. A number of these are available for a green covering where grass will not do. The three most generally acceptable evergreen covers are: Japanese Spurge *(Pachysandra terminalis)*, English Ivy *(Hederea helix)* and Myrtle *(Vinca Minor)*. These are all low growing and make a compact and uniform covering. Other plants are available and so it is best to consult a local nurseryman about the problem.

3—Care of Shaded Lawns

The ultimate success or failure of a shaded lawn will depend to a considerable degree upon the cutting of the grass. Close mowing is harmful. It is not advisable to cut with a mower set closer than 1½ to 2 inches. The effect of close cutting is to gradually starve the root system because food reserves for the roots are manufactured in the green growth above ground. The more this is limited the less extensive will be the root system, which, as we have seen, is already much reduced in shaded turf. Hence grass will not be able to meet the competition of trees and other unfavorable conditions.

The moisture used by the trees as well as the grass during dry weather must be replaced by artificial means. Shaded lawns need lots of water yet this must be applied carefully. Exact directions cannot be laid down as to when and in what quantities water should be applied. This depends upon the soil, denseness of shade, and weather. One thing is certain. If the soil texture and structure are not right it will be most difficult to keep shaded lawns alive during hot dry weather. No amount of water will overcome a puddled soil condition which bakes and cracks during hot weather. Sometimes heavy waterings simply aggravate the unfavorable features.

Method of Watering

We might point out again that lawns should not be "sprinkled." They should be watered at infrequent intervals and in such a way that the ground is thoroughly moistened to a depth of three or four inches. It is best to use sprinklers that deliver the water in a fine spray but they should not be allowed to run in one place so long that the soil cannot absorb the water as it falls. Standing water is injurious to soils so it is well to move the sprinklers long enough to allow the water to penetrate the topsoil. They can be reset later if necessary to apply additional moisture. By cutting a small plug from the turf with a knife the depth of moisture penetration can be determined.

Lawns and trees are in constant competition for the surface soil supply of food and moisture. That is why two feedings each year are suggested for them, namely: in early spring and early fall. Sometimes a third feeding in early summer is advised but this is treacherous in many instances because it is possible to overfeed lawns in the shade. There is a limit to the amount of nitrogen shaded grass can absorb. Any excess may prove to be toxic to the plants.

The suggestion to avoid applying fertilizers when grass is damp is doubly important in treating shaded lawns. This protected grass is naturally more soft and tender than that out in the open so if much fertilizer sticks to the blades there is apt to be a burning. It is wise

to examine grass carefully to satisfy oneself that it is not damp from dew or rain. Shaded lawns may be damp when surrounding grass exposed to the sun is perfectly dry. This precaution is not necessary when feeding during late winter while the grass plants are dormant, which, by the way, is to be recommended as a more general practice in the maintenance of both shaded and open place lawns. There is then no danger of burning and the fertilizer will be held by the soil until the grass can use it.

Leaves should be removed from lawns frequently. They do not offer protection but instead tend to smother the grass plants. They will do a lot of damage in winter when they become packed tightly against the ground by rain and subsequent freezing. Trespassers must be kept off lawns in the winter. Walking on frozen grass may injure the plant beyond its ability to revive.

* * *

The general care given a shaded lawn will often determine whether it is to be satisfactory. Once a good turf is established it should be guarded diligently. Strong turf can successfully withstand adverse conditions to which weak turf would succumb. For example, the washing of soil referred to as being caused by the fall of large drops of water that collect on tree limbs, is prevented only when the turf is so solid that the water spends its force on it instead of the soil. Falling leaves will do less damage to thick turf. A weak, thin stand of grass permits leaves to lodge against the soil and so smother the grass in spots while a thick turf holds them up so that they do little damage.

Without in any way minimizing the importance of all described factors, the seed used may in the final analysis determine whether your efforts will result in success or failure. No matter what the soil preparation, care in planting and feeding, all will be lost unless those varieties of grass are planted which are adapted to growth in reduced sunlight. While no variety of grass will thrive if conditions are too bad, certain kinds have physical properties enabling them better to withstand the peculiar conditions encountered in shaded lawns. Such grasses are not any more suitable for use out in the open than are the best open place varieties suitable for shaded lawns. Unfortunately, because of lack of information, or the greater cost of such seed, the correct seed is seldom provided for shaded lawns.

About Lawn Care

This issue of *Lawn Care* was doubled in size to permit a complete analysis of the shade problem. Extra copies will be furnished for friends who have been struggling with a shaded lawn. Future issues of *Lawn Care* will consist of four pages as heretofore.

You will receive the next bulletin in April instead of June for the reason that the condition of a lawn in summer depends to a large degree upon the attention it receives in late spring. We have therefore decided to permanently change the publication date of the No. 3 issue. All the available data on Crab Grass control will appear in the next bulletin.

Previous Issues of Lawn Care

There have been thirty-three previous issues of *Lawn Care* and the following lawn pests have been discussed: Plantain, Crab Grass, Dandelions, Moss, Grubs and Beetles, Chickweed, Buckhorn, Ground Ivy, Yarrow, Earthworms, Heal-all, Ants, Speedwell, Creeping Buttercup, Sod Web-Worms, Moles, Knot-Grass, Sorrel, Quack-Grass, Spotted Spurge, Yellow Trefoil, Goose Grass, Nimble Will, Knawel, Shepherd's Purse, Chinch Bugs, Sedge, Terraces, Shade, Purslane, and Peppergrass. For the complete series allow 10c to cover mailing costs.