

Applications of chemical and organic fertilizers are necessary to greens, tees and fairways if turf is to grow satisfactorily. And, although it is not commonly recognized, fertilizers are just as essential to the proper growth of trees.

This article, a continuation of one by Mr. Jacobs in our December number, tells what kinds of fertilizers to use and how they should be applied to give best results.



Feeding a tree by the perforation method. The workmen, with compressed-air tools, are boring a series of holes in the ground, out to the approximate limits of the tree's root system, prior to sub-surface fertilizing.

Fertilize Your Course Trees if Seeking Healthy Growth

By HOMER L. JACOBS
Davey Tree Expert Co.

THE FACT that feeding has remarkable value in assisting trees to withstand the effects of drought and heat should not be taken to mean that trees should not be watered in times of drought. Water is frequently a saving factor during dry seasons. But feeding alone may pull trees through where water either is not available or is not supplied. The effect of an enriched soil on moisture relations of plants has been well demonstrated by studies of soils and of field crops. For example, it has been shown that the addition of fertilizers enabled a poor soil to produce a pound of corn with 36% less water than was transpired in a similar unfertilized poor soil in producing a pound of corn under the same weather conditions. Consideration of

this fact shows why trees growing in a soil solution enriched by years of feeding may be able to grow steadily even during the very dry seasons when other trees are fighting for their very existence.

Another benefit of feeding to trees in relation to their drought resistance is the effect that it has on root growth. Experiments that have been recently made by a number of soil workers indicate that one of the chief advantages of cultivation is not the conservation of moisture due to the stirring of the soil, but instead the fact that cultivation kills weeds and so conserves moisture by reducing the moisture demands that the weeds would otherwise make. Of course with shade trees cultivation methods are ordinarily almost impossi-



Photo Hugh B. Barclay Co.

Here is how a ground cover is used. The planting of *Pachysandra* around the shallow rooted tree preserves ground moisture and prevents extreme changes in temperature.

ble because of the fact that they grow in locations where the lawns about them must be preserved. But the fact that this is true is not a matter of great concern, for it may be that cultivation and the surface application of fertilizers are not only impractical but actually undesirable for many species of shade trees.

Deep Roots Best

With many kinds of trees it has been demonstrated that any soil improvement by means of better air conditions, humus or mineral supply is followed by an increased growth of roots in the improved area. If tree roots are encouraged to develop in the top few inches of the soil, as would be the case if cultivation were practiced, then they would have to compete with grass roots for food and moisture, and they would also be subject to severe and rapid changes in temperature, both in winter and in summer. The desirability of this is questionable. As to the downward growth of roots the principal limitation is the presence of a permanent water table or completely saturated soil. This of course is just another way of saying that the limiting factor becomes a lack of air. And it is this factor that often operates where the ground around the tree is flooded or where the established water level is raised. But lowering of the water table

occurs more frequently than raising, due to such causes as basement drainage, storm sewers and the establishment of pipe lines of various sorts. In these situations, free water is not found short of several feet in depth.

In most cases vigorous root growth need not be limited to the upper foot or two of soil if more air, more nitrogen and more humus can be introduced to the mineral and moisture laden subsoil. If the active feeding roots of trees can be encouraged to develop and if they can be made to thrive in the lower soil levels, trees then become more independent of surface moisture and of severe changes in temperature.

Feeding trees by the perforation method which has been developed by tree experts, tends to bring about the enrichment of the soil well below the surface level and so has much to recommend it both from a practical and scientific standpoint. Countless observations have shown active feeding roots growing into materials that have been placed in perforation holes ranging in depth from 12 to 24 inches or more. If deep feeding of this type is repeated from year to year making many holes each time and using both organic and inorganic materials, the method cannot fail to have a beneficial effect on the speed, depth and vigor of the root system.



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Very frequently it has been observed that many trees have a decidedly shallow or surface root system even where conditions are such that deeper rooting would seem likely to take place. Such trees as the Norway Spruce and American Beech, for example, are particularly sensitive to changes that in any way affect the surface soil. The truth of this is shown by the rapid decline of native beeches when their natural environment is changed by bringing them under lawn conditions. In cases of this type the lower branches of the tree or the protecting underbrush and the surface litter are usually removed. The result is, that the surface roots are exposed to the action of the hot and drying sun in the summer and to the extremes of temperature in winter.

For trees of this type in addition to the proper use of chemical fertilizers and water it may be well to consider the use of ground cover plantings. It frequently happens that many species of plants have the ability to endure dense shade. Some of

these thrive both in shade and in partial sunshine and yet develop in such a manner that they form a dense shade of their own over the surface of the soil. When they combine this characteristic with an open type of growth which permits ready access of air and moisture to the roots, an ideal type of cover is formed for shallow-rooted trees. Plants such as *Pachysandra terminalis* or *Vinca minor* are especially good because they permit the addition from time to time of leaves, manure, peat moss or other humus forming materials into which these shallow roots can grow. And still the crowns of the plants form a permanent and protecting cover just a few inches above the shallowest tree roots. In connection with mulches the addition of nitrogen is especially needed because of the fact that bacteria which cause the decay of the mulch material make very heavy demands on the nitrogen supply. This may result in a scarcity of this material for the tree.

In feeding trees, proper chemical fertilizers can be applied with safety and

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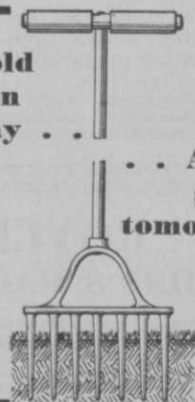
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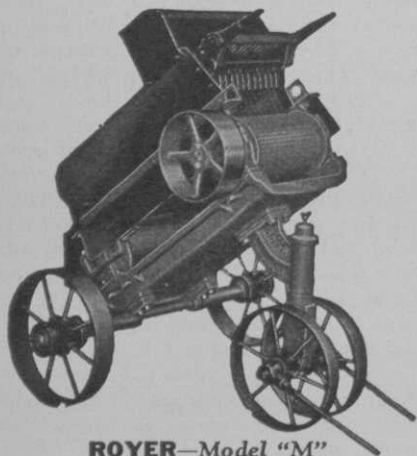


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benefit from early spring until late fall or even during the winter if the ground does not freeze. Even so, we still find among some horticulturists the remains of a fear that almost any cultural treatment applied in midsummer is likely to cause a forcing out of late growth which will be winter injured. This fear is probably due to experience with tender shrubs, perennials or possibly some fruit trees such as the peach. However, the evidence in the literature on fruit trees gives no definite facts on which to base a fear of using moderate amounts of chemical fertilizers in midsummer. With the majority of shade trees it is certain that no evidence exists to show that midsummer applications are anything but beneficial.

Another belief that has disappeared is with reference to the application of nitrogen fertilizers in the fall. Until recent years horticulturists quite generally believed that such applications would not be taken up by the trees but instead would be leached out and lost during the winter months. Without discrediting the evidence that nitrogen does leach out readily, there is evidence to show that trees can take up the nutrients which they need even after their leaves fall. Now, as the result of numerous and exhaustive experiments, it has been well demonstrated that late fall applications of nitrogen are just as efficient and beneficial as when similar materials are applied in the spring.

Still another misconception, that is met with at times, concerns the fear of using chemical fertilizers on conifers or other evergreen species. With conifers, which are usually shallow rooted, the use of mulches and ground covers is particularly important. But, unfortunately, these types of treatment do not adequately supply the needed food elements if the soil is poor. Feeding is frequently quite essential and now both research and practical experience in most cases have shown that splendid results may be obtained from the proper use of fertilizers on conifers.

With important trees such as those that border the fairways or that shade the tees, it would in many cases be entirely feasible to guard against the unfavorable effects of dry weather by installing watering systems for trees. This would merely involve additional piping extended from the established watering system which provides water to the greens and in certain cases to the fairways.