air in the form of synthetic compounds. In 1934 these synthetic products resulting from the industrial "fixation" of nitrogen of the air furnished 74.5 percent of the world's supply of nitrogen. Only 7 percent came from the deposits in Chile and the remaining 18.5 percent from by-products in the manufacture of coke and gas from coal.

SOIL FERTILITY AFFECTS KENTUCKY AND CANADA BLUEGRASS

The reason why Kentucky bluegrass grows on one soil and Canada bluegrass on another was studied by Hartwig in New York, who published his results in the Journal of the American Society of Agronomy. Two areas were examined, in one of which Kentucky bluegrass (*Poa pratensis*) was dominant, in the other, Canada bluegrass (*Poa compressa*). In both areas patches of the other species occurred and soil samples were taken under each species in both areas.

These areas were studied in various ways. Contrary to the prevailing notion that *Poa compressa* is found on the more acid soils, Hartwig found the acidity of the soil under this species lower than under *Poa pratensis.*

The most important feature was that under *Poa pratensis* there was generally more total nitrogen and more available phosphate than under *Poa compressa,* though the difference in the quantity of phosphate was small. From this it would seem that the former occupied the more fertile spots. This idea is in harmony with Hartwig's observation that in the area where Canada bluegrass is dominant, pastures which receive much manure soon become set with Kentucky bluegrass.

SHADE AFFECTS ACTION OF SULFATE OF AMMONIA ON TURF

Recently two British investigators, Blackman and Templeman, publishing in the Annals of Applied Biology, have discussed certain conditions under which sulfate of ammonia does not benefit grass and discourage clover. Where the shade is deep enough to limit growth (where the light intensity is equal to less than .44 that of daylight) apparently it is the grass and not the clover which is adversely affected by the addition of sulfate of ammonia.

The production of leaves depends upon the grass plant taking up nitrogen from the soil and synthesizing proteins within its cells by chemically combining the absorbed nitrogen with the carbohydrates which are manufactured in the leaves. In full sunlight carbohydrates are assimilated rapidly and are then combined with the nitrogen absorbed from the soil to manufacture proteins and thus produce more leaves.

When grass is growing in the shade, however, it is not assimilating carbohydrates rapidly enough to make use of the nitrogen which is continually being absorbed from the soil. There are carbohydrate storehouses in the roots and lower parts of the shoots and the growing cells draw on these while they last. When the grass is cut a time or two, however, these carbohydrates are removed from the plant. The rate of growth of the grass leaves then becomes directly proportional to the quantity of carbohydrates which can be manufactured in the leaves and hence to the amount of sunshine which the plant receives. The amount of absorbed nitrogen which can be assimilated into proteins in the grass cells is proportional to the amount of carbohydrates produced and hence to the amount of sunlight. This means that not all of the nitrogen which is absorbed in the shade can be used and it therefore accumulates in the plant. The accumulation of nitrogen apparently depresses growth.

The writers were working with Colonial bent (*Agrostis tenuis*), red fescue (*Festuca rubra*) as well as clover (*Trifolium repens*). They demonstrated in their experiments that when these grasses were grown in shade of .44 (or less) of daylight, leaf production was depressed by a high nitrogen supply in the form of sulfate of ammonia. Nitrogen in the form of calcium nitrate depressed leaf production much more than did sulfate of ammonia. As would be anticipated from the foregoing discussion, the depressing effect of nitrogen in the shade became progressively greater with successive cuttings. At the same time there was no such depression in the leaf production of clover. This may have been due to the fact that the clover, unlike the grasses, did not continue actively to absorb nitrogen in the shade.

Copper sulphate is recommended for the control of earthworms, diseases, and other turf pests in Great Britain and New Zealand. In the United States copper compounds were commonly used in turf several years ago and are still used occasionally. They came into general disrepute when it was learned that under some conditions in this country copper accumulated in the soil and caused serious damage to turf.