WAR AMONG PLANTS

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Many species of plants, and more particularly those used for hay, pasture, and turf purposes, are sown in mixtures. Dominance of any given species in any particular environment has usually been attributed to differential moisture, temperature, light, and fertility requirements. Investigations have shown that the development and activity of the roots of certain species of plants may be affected by the growth of adjoining roots and that some species of plants may have a specific effect on other species which follow in the rotation. There is considerable difference of opinion in the literature as to the cause of specific interactions which have been noted. Toxic secretions, deficient oxygen, excessive carbon dioxide and moisture, harmful pH, nitrogen starvation, and changes in soil microflora are among the more important factors listed as possibly being involved in specific root interactions. Plants, just like human beings, have antagonisms toward each other. Wars are going on between species and strains. One plant may excrete a substance from its roots which will inhibit the normal development of some other plant. These problems are very important factors in plant associations.

The deleterious effect of black walnut trees on near-by plants has been observed and studied both in cultivated fields and in forests. In places where this effect is evident there is conspicuous around the tree a zone or so-called toxic court in which certain species are absent or dwarfed although in the surrounding areas they are flourishing. Alfalfa, tomato,

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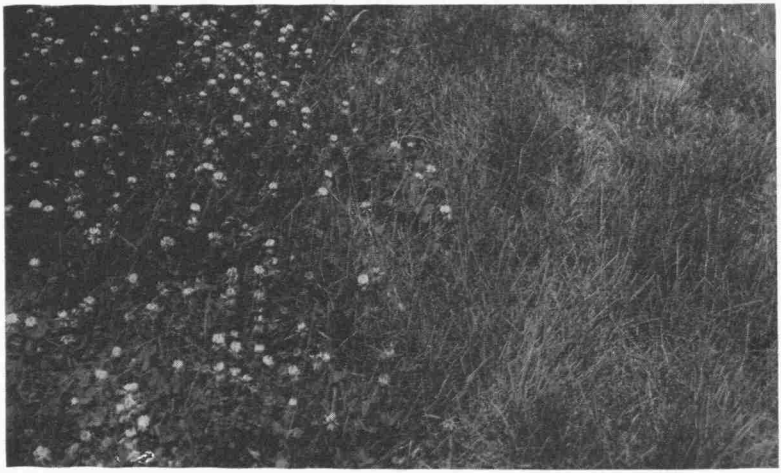
loblolly pine, and apple have been listed among the species which are most susceptible to walnut injury. Other species of trees of similar size, growing in the same area and apparently using just as much soil moisture and nutrients as the walnut, do not interfere with the growth of these plants. In fact, the inhibitory effect has been shown to be dependent on a root-to-root contact between the walnut tree and the affected plants.

A similar antagonistic relationship exists among some of our grasses and legumes. Extensive botanical studies have been made on the effect of various fertilization and management treatments on the productivity and survival of a number of species of plants used for hay and pasture.

The species studied included Kentucky bluegrass, timothy, redtop, red clover, alsike clover, and white clover sown as a mixture. Field observations made since the experiment was initiated seem to indicate the occurrence of a number of species interactions which cannot be accounted for on the basis of differential response to light, temperature, moisture, fertilization, and management. White clover and red clover were seldom found in dense, closely grazed quackgrass sod, whereas alsike clover appeared in comparative abundance. Canada bluegrass, although not seeded, invaded areas not fertilized with commercial nitrogen. In mixed plantings, Canada bluegrass, redtop, timothy, and Kentucky bluegrass were observed to occur as definite colonies rather than blending uniformly throughout the sward. Redtop was eliminated early by Kentucky bluegrass.

In another experiment six replications of timothy, Kentucky bluegrass and two strains of brome grass were grown under various soil treatments and management programs. One of the variables consisted of a mixture of red, white, and alsike

clovers sown across the grass plots. All of the plots had perfect stands of grasses and legumes in the fall before growth was stopped by low temperatures. The following winter was mild but with little snow cover. In the spring a very marked differential interaction between the clovers and one of the grasses was evident. The Kentucky bluegrass was practically



Competition between white clover and Kentucky bluegrass. White clover was established uniformly on both of these plots.. It persisted with the bluegrass strain on the left but was practically eliminated by that on the right.

eliminated from that portion of each plot on which the clovers were growing in association with the grass. The stands of the two strains of brome grass and timothy were uniformly good on all the plots regardless of treatment or association with legumes.

At the U. S. Regional Pasture Research Laboratory, State College, Pennsylvania, intensive breeding programs with Kentucky bluegrass and white clover are under way. Hundreds

of strains of these two species have been selected and are now being tested in small plots. Several of the better strains of each are being tested in various combinations. While certain of these strains have grown well together, some strains of bluegrass have almost completely inhibited the development of white clover. Likewise some strains of white clover have predominated over the bluegrass.

Bent grass seed mixtures produce a mottled or mosaic turf because of variability in color, growth habits, disease reaction, etc., of the plants composing the mixture. Very often a particularly aggressive strain is found occupying a larger area than would be expected normally if moisture, nutrients, etc., were the only factors limiting growth and spread. In experimental bent grass plots, also, strains growing in adjacent plots show marked differences in ability to invade other strains or sometimes to resist invasion by other strains apparently having greater vigor when grown in pure culture. C-15 and C-52 are good examples of bent grass strains which are particularly aggressive when grown under certain conditions.

Special strains of grasses may be developed that are not only more persistent in competition with other strains of the same species but that also possess characteristics enabling them to check or inhibit invasion by other grass species, clover, or weedy plants. In 1941 an unusually severe invasion of bent grass turf by *Poa annua* was reported, particularly in the East. Observations on Experimental Greens of the U. S. Golf Association Green Section verify the observations made over a period of years on the Turf Garden at Arlington Experiment Farm, that certain selected strains of creeping bent are conspicuously more resistant to invasion by *Poa annua* than are commercial strains.

These observations and limited experimental evidence would appear to indicate that harmful root interactions may occur between various species of plants. These interactions are no doubt profoundly influenced by environmental conditions, but their full significance will not be known until they have been tested adequately under various light, moisture, fertility, and management conditions. There is need for intensive fundamental study relative to the nature of these interactions and their effect on grass species now commonly used for turf. The possibility of using these interactions in the control of clover and weeds in turf is a problem deserving of prompt consideration by turf culturists.

PROTECTION AGAINST FALSE CLAIMS FOR FUNGICIDES AND INSECTICIDES

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The Insecticide Act of 1910 is administered by the Insecticide Division of the Agricultural Marketing Service and it is important to understand what protection against false claims for fungicides and insecticides may be expected from its enforcement. This law requires that the labels of insecticides and fungicides entering into interstate commerce or marketed in the District of Columbia or the Territories shall not bear any false or misleading claims regarding such articles and that they shall not injure vegetation on which they are intended to be used. Manufacturers and distributors are held strictly responsible in this respect. However, since the burden

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