HARMFUL ROOT INTERACTIONS AS A POSSIBLE EXPLANATION FOR EFFECTS NOTED BETWEEN VARIOUS SPECIES OF GRASSES AND LEGUMES

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Many species of plants and more particularly those used for hay or pasture 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 metabolism of adjoining roots and that some species of plants may have a specific effect on other species which follow in the rotation. An excellent review of the literature on this subject has been made by Loehwing. 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, and nitrogen starvation are among the more important factors listed as being involved in specific root interactions.

It is the purpose of this preliminary report to call attention to the possible existence of harmful root interactions between various species of pasture grasses and legumes and the need for further investigations relative to the extent and importance of this phenomenon under varying light, moisture, temperature, and fertility conditions.

Extensive botanical studies relative to 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 purposes were begun at the University of Wisconsin in 1935. Included among the species studied were Kentucky bluegrass (Poa pratensis), timothy (Phleum pratense), redtop (Agrostis alba), red clover (Trifolium pratense), alsike clover (Trifolium hybridum), and white clover (Trifolium repens). Field observations made since the experiment was initiated seemed to indicate that a number of species interactions occurred which could not 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 quack grass (Agropyron repens) sod whereas alsike clover appeared in comparative abundance. Canada bluegrass (Poa compressa), although not seeded, was found in areas which were not fertilized with commercial nitrogen. 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 August of 1938 a series of experimental pasture and meadow field plats were sown to compare the yield and survival of two strains of brome grass (Bromus inermis), both commercial and parkland,