Environmental Relations and Grub Injury of Bluegrass.—L. F. Graber, University of Wisconsin.

That the environment has a most profound influence on the degree of injury sustained by bluegrass (Poa pratensis L.) from infestations of white grubs (Phyllophaga spp.) has been made manifest by field observations and controlled experiments at the Wisconsin Experiment Station. The severe outbreaks which occurred in 1927 and 1928 and which recurred in 1929 and 1930 have caused heavy losses in the destruction of thousands of acres of pasture sods in southern Wisconsin. Most species of the white grub have, normally, a life cycle of 3 years of which about two-thirds is spent in the larval stage so that during all or a part of each year these insects feed on grass roots and rhizomes.

In general, under field conditions, wherever the root and rhizome development of bluegrass (the dominant species) was retarded by deficient fertility or deficient organic food reserves, due to close premature grazing, or by thin and dry soils, due to hillside outcappings of limestone or flint, the injury was made most evident by a rapid secondary succession of ragweeds (Ambrosia sp.), mullein (Verbascum sp.), and other undesirable plants.

In the field, not only were the grubs more numerous with an unfavorable environment, but with equal numbers of grubs in controlled cultures of bluegrass the injury was most severe when one or several factors retarded the quantitative development of subterranean growth and its regenerative activity.

Studies of the Hardiness of Plants.—S. T. Dexter, University of Wisconsin.

A method for the study of hardiness of plants is presented, based upon the principle that mineral matter will readily diffuse from tissues injured by freezing, whereas it is retained by those tissues sufficiently hardy to escape injury. By measuring the electrical conductivity of water into which this exosmosis has taken place, the degree of injury may be determined.

Charts and figures are shown which demonstrate the rate and ultimate hardening of several varieties of alfalfa throughout the autumns of 1929 and 1930. Further application of the method to varieties of red clover from different parts of the world and to field-grown winter grains gave satisfactory results in detecting the recognized varietal differences in cold resistance. In each case, varieties of known hardiness gave much less exosmosis than tenderer varieties.

Individual roots of several varieties of alfalfa were studied by another method based upon the principle that the electrical conductivity of the root itself is increased by freezing injury. Marked differences in the hardiness of individuals within a variety could be shown, as well as the gross varietal differences. It was shown that in the Grimm alfalfa root hardening begins at the crown, and that the...