Winter killing is one of the most common causes of the loss of stands of alfalfa throughout the major alfalfa growing areas of North America. Proper management may completely alter the winter survival and agronomic value of alfalfa. Of the many cultural practices which have been shown to influence the winter hardiness of alfalfa, fall management is one of the most important. This has been demonstrated by the work of Rather and Harrison (5) and Rather and Dorrance (4) in Michigan; Grandfield (2) in Kansas; Mark (3) in Iowa; Tysdal and Kiesselbach (6) in Nebraska; and Brown and Munsell (1) in Connecticut. Their research indicated at least one common conclusion—that the removal of top growth in the fall reduced forage yields. Specifically, removal in September and early October reduced both winter survival of alfalfa plants and forage yields the following season.

Under Michigan conditions, clipping after September 1 reduced plant vigor and yield. The same was generally true in Kansas where alfalfa plants were found to reach adequate winter hardiness sometime in late October. Many northern states recommend that alfalfa should not be clipped or grazed between the first week of September and mid-October or the first killing frost. This allows the plants to synthesize carbohydrates which accumulate in the roots and crowns. These food reserves are used for cold resistance, maintaining life over winter and promoting new growth in the spring.

At this latitude the date of the first killing frost may vary by several weeks from year to year. Using the time after which alfalfa may be safely grazed as the date after which alfalfa may be safely grazed would sacrifice valuable grazing time in the years when this date falls after mid-October.

There may be little relationship between environmental conditions which are necessary to increase cold resistance and the date of the first frost. This would likely decrease the value of using such a date when it occurs before mid-October. The time at which adequate cold resistance may vary by several weeks depending on the manner in which environmental conditions influence the accumulation of carbohydrates.

Because of the high degree of association between temperature and cold hardiness, it was thought that some type of a soil temperature parameter would be most helpful in determining more accurately the time when adequate hardiness may be reached. This study is concerned with the relationships between cold hardiness as determined by electrical conductivity and crown recovery and soil temperature.

**MATERIALS AND METHODS**

At frequent intervals during the fall periods of 1956, 1957, and 1958, the cold resistance of root and crown samples of alfalfa was determined using the electrical conductivity method.