

and its dispersal through the year. Organic matter levels coincide with CEC values in the Peninsula soils, and organic matter is the major contributor to these CEC values.

The pH values remained in the neutral to slightly alkaline range for the peninsula soils, as in previous years. The tendency for the pH levels to increase in the fall and winter seasons, especially in the Hackberry-Box Elder and Hackberry II communities, was attributed to the litter fall and the accompanying release of bases into the soil profile.

The levels of sulfates (ppm) remained very low in the Peninsula area in 1979. However, in comparison to 1978, the levels are increasing in each of the three sites and at each depth sampled. (During 1979, there was an increase in sulfates from the summer to the fall, but the changes did not occur in any particular pattern.) The largest changes were at the 10 cm depth in the Sumac/Hackberry/ Box Elder community; but such increases did not influence soil pH or base saturation, as they have in other locations. The changes in sulfate levels appear cyclical; the levels declined from 1977 to 1978 and increased again to 1979. Moisture in the form of natural precipitation likely is responsible for these changes.

One other factor which may contribute to the high CEC values in the Hackberry II community is nitrates ( $\text{NO}_3^-$ ). Nitrate levels were very high in summer (173 ppm) but were greatly reduced by fall (13 ppm). The nitrates are highly soluble and would be readily lost to percolating water and in surface runoff when the soil reaches field capacity. The concentration of nitrates near the surface, associated with the organic matter and the accompanying fungi and bacteria, would provide a temporary source

The soil cooled somewhat more slowly in the Tower Woods than in the Peninsula area during fall 1979, reaching a level below 40° during the week of November 23, compared to the week of November 9. The cooling was one week later than the Tower Woods in the previous year. The soil froze at the 10 cm depth during the week of December 14, two weeks later than the Peninsula area in 1979 and the Tower Woods in 1978. The maximum range of soil temperatures at 10 cm occurred later than in 1977 and 1978, mid-April to mid-May compared to early March to early April (1978) and mid-March to early May (1977). However, the ranges in 1979 exhibited the same spring double peak in 1979 as in 1978. During the summer and fall 1979, temperature ranges at 10 cm were generally lower than in 1978.

The average soil temperatures at 20 cm varied in a pattern similar to the 10 cm depth, except during the winter 1979. The soil at the 20 cm depth did not freeze until the week of February 9, when the low level was reached. The temperatures during winter 1979 averaged about 8 to 10 degrees higher than the winter of 1978. The temperature reached 40° during the week of April 20, the same as at the 10 cm depth in the Tower Woods and one week later than the Peninsula area. The temperature remained cooler than at the 10 cm depth from the week of April 20 to the end of August. The peak temperature, reached during the week of August 10, was 4.5 degrees cooler than at the 20 cm depth in 1978. The temperature at 20 cm decreased to below 40° during the week of November 9, one week before 1978, but did not reach the freezing point until the week of December 28, compared to the first week of December 1978. The ranges of temperatures