Among the many unexplained phenomena concerning the organic matter in soils one of those having greatest economic importance is the occasional loss of soil nitrogen not traceable to removal in crops or drainage water. That such a loss sometimes occurs is supported by experimental evidence from several sources. That it does not always occur is confirmed in the same manner.

The earlier evidence indicating the loss of nitrogen in this way was based on experiments in which soil nitrogen was determined at the beginning and end of a period of years during which crops were harvested, weighed, and analyzed. A large discrepancy between the loss of nitrogen during the period, as shown by analysis, and the loss to be accounted for by removal in crops, suggested that drainage water might not account for the difference and that it might be due in part to escape of nitrogen in a gaseous form. Numerous experiments of this nature have been reported by Lawes, Gilbert and Pugh, Snyder, Alway, Whitson, and others, but in some cases the data for nitrogen removed in crops have been only estimated.

Possibly the most striking experiment of this class was one reported by Shutt (9) who found that of the loss of nitrogen after breaking and cropping a virgin prairie soil only one-third could be charged to the crops grown on it. The unaccounted loss was 75 pounds per acre annually during a period of 22 years. However, other somewhat similar experiments reported by Shutt do not imply this unaccounted loss of nitrogen. Lipman and Blair (1) also found an average annual unaccounted loss of 70 to 100 pounds in soil cropped without legumes but heavily manured. The experiment covered a period of 20 years.

Wright (10) conducted experiments with soil in large buckets for one season. There was no drainage from the buckets. A number of different plants were grown. The soil of each bucket was analyzed at the beginning and at the end of the experiment. In the case of every crop except one the nitrogen lost from the soil, as shown by analysis, was greater than the quantity contained in the crop.

There have been large losses of nitrogen reported by other investigators who kept no record of the nitrogen in the crops grown. These losses could probably not be accounted for by removal in crops. In recent years some experiments have been conducted in which the entire income and outgo of nitrogen have been measured. In experiments of this kind the soil at the beginning and end of the experiment period was analyzed, as were also the crops removed, the manure or fertilizer applied, the water added or received as rain and snow, and the drainage water from the soil.