



Does Snow Provide any Soil Fertility Benefits?

A late snow while often a miserable headache after a long winter, may have some benefits that will help ease the pain. Snow has often been referred to as “Poor Farmer’s Fertilizer”, and not only can it contain Nitrogen (N), but trace elements as well. There are other benefits of snow in agricultural systems:

- It can provide over 60% of the annual of precipitation received in Northern areas.
- Acts as an insulating blanket, with as little as 2 inch of snow cover can raise the soil temperature above freezing protecting plants, such a winter wheat and alfalfa.
- A water source for winter pastured cattle.

// How much N is in precipitation?¹

That depends on location, generally speaking the total annual amount of N from all precipitation is about 5 lbs/acre on western edge of the Corn Belt and 12 lbs/acre on Eastern Corn Belt. A single 9-inch snow event in South Dakota the snow contained about 2 inches of water, 0.3 lbs per acre of available N.

// What forms of N are found in snow?¹

There are two forms of N found in precipitation, nitrate (from nitrous oxides) and ammonium. While lightning contributes to 5 to 10% of the nitrous oxide, but the remainder comes from human activity such a emissions from automobiles and industrial plants. The ammonium comes from soil microbial activity, manure, and volatilization from fertilizer, urea. Ammonium can make up from 25 to 75% of the total N in precipitation. Because the majority of N in precipitation is the result of human activity, this explains the higher level of N in the Eastern Corn Belt.

// Can N fertilizer be applied on top of snow and will it be beneficial?²

Research from South Dakota State University found that when urea was applied to snow on top of winter wheat yields were reduced about 18% when compared to urea applied to bare ground. Similar observations have been observed in Kansas. In addition to the negative agronomic impact, when N is applied to snow or frozen soil, it increases the chance of run-off, particularly on sloping fields.

// Are there other nutrients in precipitation?³

There can be trace amounts of many elements in precipitation, sodium, potassium, magnesium, calcium, and sulfur are the most common, but the amount is usually so low that they would not have an impact on crop production.

Sources

¹2017. And then it snowed...any free N with that? University of Minnesota Extension. <https://blog-crop-news.extension.umn.edu/2017/04/and-then-it-snowedany-free-n-with-that.html>

²Mengel, D. and Duncan, S. 2008. Surface applications of nitrogen on snow-covered fields of wheat. Kansas State University Extension. <https://www.agronomy.k-state.edu/documents/eupdates/eupdate011808.pdf>

³Carroll, D. 1962. Rainwater as a Chemical Agent of Geologic Processes A Review. United States Department of the Interior. <https://pubs.usgs.gov/wsp/1535g/report.pdf>