

Soil Acidification Trends and Solutions

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Crop yields are decreasing due to acidic soils. No-till practices paired with heavy nitrogen (N) use have lowered the surface soil pH on many acres of the Northern Great Plains. Acid soil where the pH drops below 5.5 has an impact on nutrient availability, soil microbial activity, stunted roots from aluminum (Al) toxicity and other plant/soil interactions. These areas can be improved from surface liming; however, liming can be costly. For many producers facing this issue, especially those working rented land, there is a search for alternative options to reduce yield loss on acidic ground. Research has been conducted in western North Dakota on surface liming and on adaptive management strategies for mitigating the symptoms of aluminum toxicity and soil acidity including cultivar selection, in-furrow fertilizer application, and seed treatments. Variety selection showed a significant difference in yield with a 182 kg/ha and 1204 kg/ha increase in the aluminum toxicity tolerant variety compared to the susceptible variety. Calcium based fertilizers in-furrow did not have an impact on yield. Across wheat varieties a yield bump of 101 kg/ha in 2021 and 625 kg/ha in 2022 was shown from seed placed P (0-45-0) applied at high rates (67 kg P₂O₅/ha). The data suggests use of tolerant wheat varieties along with in-furrow P fertilizer can be used to alleviate symptoms of an acid soil. Ideally producers should be applying tons of lime to bring the pH above 5.5 because the variety and fertilizer may fix the yield loss but does not fix issues with pesticide breakdown and carryover, soil microbiological activity, and nutrient tie-up; all issues caused by acid soil.