Acidic soils of the Tropics



(/resources/19e297fc-ff79-4e9a-9730-0b57b32df0b7)Acidic soils are soils with a pH lower than 7. For most plants, having a pH between 6 and 7.5 is ideal (see table 1 for more exact numbers), but soils can become dangerous when their pH drops beneath 4.5. As the pH drops, aluminum becomes more soluble, toxifying the soil and harming the plants. Bacteria activity and nitrogen fixation (the process in which atmospheric nitrogen is 'fixed' into an organic form that is useable for plants) also decreases if the soils become too acidic.

Table 1. Ideal pH levels for common crops[3]	
Maize	6.8
Wheat	6.8
Oats	7.5
Barley	7.5
Soybean	6.8

So how does it happen? Soil particles typically carry a slightly negative charge, which is what holds positive cations like calcium, manganese, potassium, sodium, and others in place. However, the attraction between the slightly negative soil and hydrogen ions in water are much stronger. This means that with heavy rainfall (which is naturally slightly acidic) and well-drained soils, the hydrogen ions will replace the other cations (nutrients) in the soil. This is also known as leeching, when the nutrients get replaced and pulled down and out of the soils by being replaced by hydrogen ions.

Luckily, there are some simple solutions to acidification of soils. Limestone is commonly used to help raise soil pH, although this might not be a viable option for subsistence farmers due to availability and expenses. The "slash and burn" farming you often see employed in the tropics can also decrease acidity due to a release of nutrients from the burned materials, although this isn't a very sustainable option. For small-scale farmers, using crushed bones for their calcium content to help raise their soil pH can be an alternative.

It is important, however, not to overdo it. When you raise your pH too high using limestone, you run the risk of reducing porosity of your soils which can lead to poor drainage. When adding limestone, the recommended pH level to bring your soil up to is around 5.5—at this level, the aluminum in the soil is deacvtivated and the risk of over-liming is low.[2] To read the full article, follow this link to download the pdf.

References

[2]Harter, Robert. "Acid Soils of the Tropics." ECHO Development Notes, 2002. ECHOcommunity.org.
[3]Soil Quality Indicators. Apr. 2011. USDA Natural Resources Conservation Service.

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