



knowledge to grow



Base and Percent Base Saturation

Percent base saturation sounds like it is describing the percentage of water it takes to saturate soil, but it doesn't have much to do with soil moisture and has a lot to do with soil chemistry and cation exchange capacity (CEC).¹

Base saturation refers to the proportion of exchangeable cations (positively charged ions) in soil that are comprised of the basic cations calcium (Ca), magnesium (Mg), potassium (K), and sodium (Na). These cations play an important role in soil fertility and plant growth as they affect soil pH, water uptake and nutrient uptake by plants. Cation exchange capacity (CEC) is a measure of the soil's ability to hold and exchange these specific base cations. The percent base saturation is the ratio of basic cations to the cation exchange capacity expressed as a percentage. As a rule, per cent base saturation increases with increasing pH and soil fertility.¹

The importance of base saturation lies in the fact that it directly impacts the soil's ability to support plant growth. If a soil has a low base saturation, it can lead to nutrient deficiencies and reduced plant growth. On the other hand, a soil with a high base saturation can lead to soil alkalinity, making it difficult for plants to take up essential nutrients.²

Base Saturation is often used as an indicator of overall soil health. A soil with a balanced base saturation is more likely to have a stable pH, retain essential nutrients, and provide optimal growing conditions for plants.² A soil with an imbalanced base saturation can also affect the population of beneficial soil microorganisms, which play a critical role in soil fertility and plant health.³

There are several factors that can influence Base Saturation, including soil type, land use, and nutrient management practices. For example, intensive agriculture can lead to the over-use of fertilizers, which can reduce the base saturation of essential cations like Ca and Mg, leading to soil degradation and decreased plant growth.^{2,3} Understanding base saturation is important for effective soil management and sustainable agriculture and gardening practices.



Soil Science Fun Fact!

One teaspoon of healthy soil may contain between 100 million and 1 billion living bacteria. That's as much mass as 2 cows per square acre of land. Gardeners may not realize it but if they're building healthy soil, it is full of microscopic livestock helping to nurture the soil!



References:

1. Gregorich, E.G., et al. (Eds.). *Soil and Environmental Science Dictionary*. Canadian Society of Soil Science. CRC Press, 2001.
2. Nandini, R., & Manjunath, J. (2015). Soil health and fertility management. *Indian Journal of Fertilisers*, 11(11), 19-24.
3. Rai, L. N., Pandey, P., & Nautiyal, S. (2019). Soil health and fertility management. *Indian Journal of Soil Conservation*, 47(1), 1-6.
4. Hoorman, James J., Role of Soil Bacteria. *Ohioline: Ohio State University Extension*. Printed factsheet. June 6, 2016.