Profitability of Fertility Correction Explained

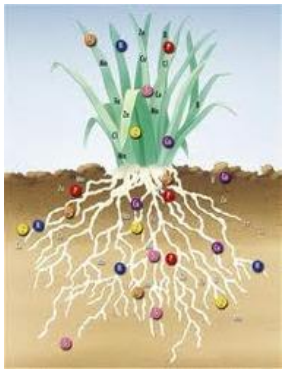
Technical Bulletin

Precision Agriculture Services

For crop production, the soil is one of the farm's most important asset. Soil fertility is a key factor for success. Everything must be done to maximize productivity.

What Does "Fertile Soil" Mean?

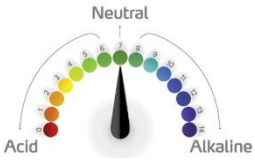
Fertile soil must contain the adequate and balanced quantities, according to its own characteristics, of all the necessary nutrients (nitrogen, phosphorus, potassium, magnesium, calcium, sulphur, zinc, manganese, copper, boron, etc.) to provide optimal crop growth. To be fertile, a soil must have a pH between 6 and 7 depending on its type and must contain organic matter which improves its structure as well as water and nutrient retention. Moreover, it must have the "essential prerequisites" to provide oxygen and water and thus promote the optimal development of the root system and crop growth.



Essential prerequisites relate to the aspects of soil physics, such as compaction control, proper drainage and land levelling. These aspects must therefore be corrected before tackling soil fertility.

How Does a Soil Become Less Fertile?

pH



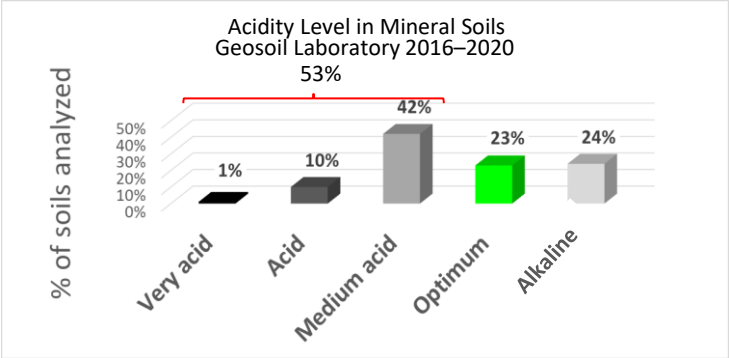
A decrease in soil pH can cause nutrients, such as potassium, phosphorus, calcium and magnesium, to become less available to the crops while others, like aluminum, can reach toxic levels. It can also cause a significant decrease in the efficiency of organic matter, organic fertilization and synthetic fertilizers.

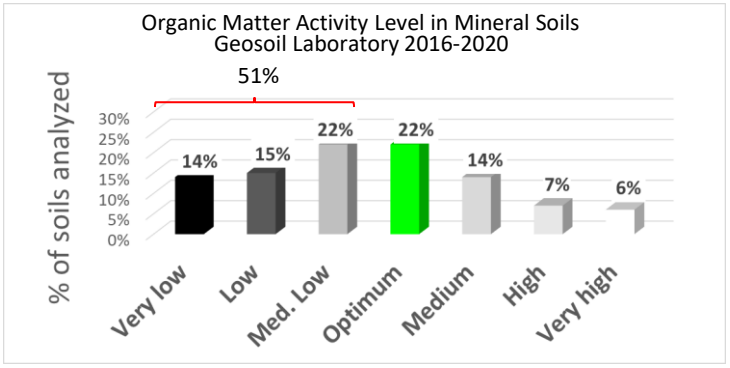
Optimal pH helps retain nutrients and release fixed phosphorus, making them available to the crops. Organic and synthetic fertilizers are more effective at optimal pH, so lower inputs allow higher yields to be achieved.

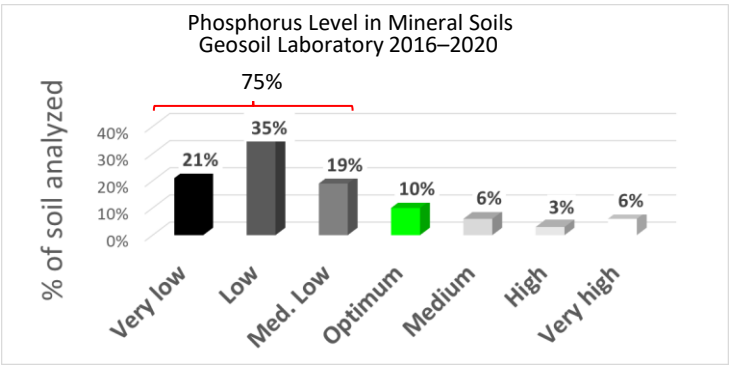
During harvest, nutrients are removed from the soil, causing its depletion, which are called ''exports''. To avoid soil depletion caused by crop-related exports, fertilization must compensate these losses. The higher the yields, the higher the nutrient loss and the higher the risks of soil depletion.

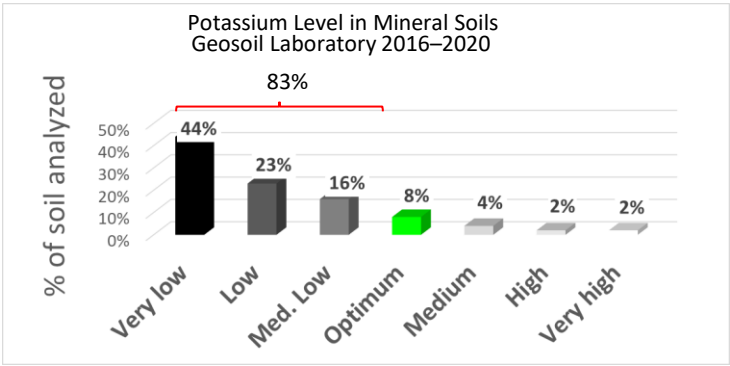
Are our Agricultural Soils Fertile?

According to data from several thousand soils analyzed between 2016 and 2020 by Géosoil laboratory, more than half of the soils have a pH (53%) and active organic matter (51%) below optimal levels. In addition, the majority of these soils are deficient in phosphorus (75%) and potassium (83%). The correction of soil fertility must definitely be considered in order to improve farm profitability.





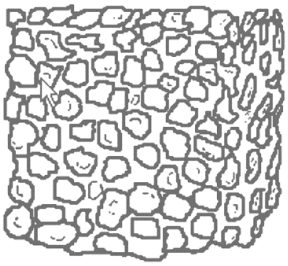




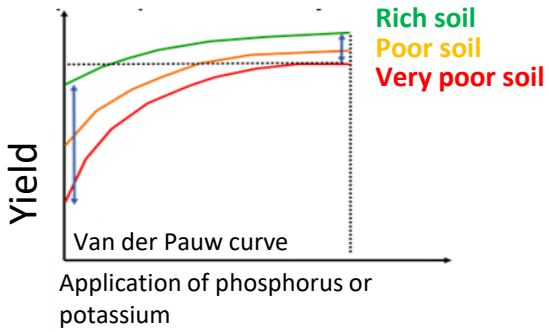
Why Should We Cultivate Fertile Soils?

The soil's ability to provide nutrients is responsible for 20% to 30% of the yield.

First of all, it should be noted that the physical condition of the soil is **the most important factor influencing yield.** The physical condition of the soil refers to its texture (particle size: sand, loam or clay) and its structure (particles bound in aggregates). Texture and structure have a direct effect on the development of the root system and water supply (the most important abiotic stress).



More fertilizer (phosphate and potassium) is required for less yield in poor soil than a rich one.



That being said, when the essential prerequisites (proper drainage, compaction control and land levelling) are optimal, the ability to provide mineral elements (food capacity) **then becomes the most important limiting factor in achieving yields.** Poor soils require more fertilizers for lower yields, hence the importance of cultivating fertile soils.

What Does Soil Fertility Achieve?

The increase and maintenance of soil fertility allow for a recurring increase in yield potential, a decrease in the annual maintenance fertilization of the crop and therefore a decrease in the production cost per tonne harvested. The cost per tonne of harvested produce is a very important measure because it determines the level of profitability of the farm.

Good fertility correction programs allow the farm to grow from the inside, that is, to produce more crops with the same area of land. In a context where the price of land is very high, the adjustment of soil fertility turns out to be a profitable operation for the farm. Take the example of a 100-hectare land plot for which the yield increase would be 10%; this is equivalent to the production from 10 hectares bought and exploited. Over the past few years, we have observed yield increases ranging from 5% to 15% and sometimes even more following the implementation of a soil fertility correction program.

Producing more with the same area of land = using less pesticides, less fertilizer, less seeds, less fuel and reduced labour hours to obtain the same ton of crop.

How to Restore and Maintain Soil Fertility?

Three causes of variability can make the liming and fertilization processes—aimed at enriching and maintaining soil fertility—costly and uncertain: variability of the types and series of the soil, variability of the fertility of a same type or series of soil, and yield variability which has a direct impact on nutrient losses linked to exports. Georeferenced soil sampling (GPS) makes it possible to manage these variabilities and optimize fertility correction operations.

THIS OPERATION IS CARRIED OUT IN THREE STAGES

1. The first step is to perform GPS soil sampling to measure the state of the fertility of the field. Then, a document with a complete diagnostic of all nutrients is provided to help make the right decisions.
2. The second step is to prepare the lime and variable rate fertilizer prescriptions compatible with all spreading systems used.
3. The third step is to proceed with variable-rate product applications. This approach was designed according to the **4R** principle: the right amount of the right product, at the right time and in the right area.

For more information, see our technical bulletin "It's Time for GPS Soil Sampling: Book Yours" and contact your Synagri representative to book your precision farming services.

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