

Phosphorus content of the surface layer

Phosphorus (P) is also a major nutrient, one that plays an essential role in all stages of plant growth. It conditions and regulates growth (Magny and Baur 1962), and it is essential for respiration, photosynthesis and a number of other vital processes (QFMA 1990). Either mineral or organic fertilizers may be used to add phosphorus to the soil.

The five phosphorus content classes are shown in Table 1. As will be seen, available P content in the surface layer correlates with taxonomic order, surface layer texture and reaction class. Soils with very low P content account for 22.2% of the study area (Table 1). These are usually acidic, sandy- or loamy-textured podzolic soils (e.g. Saint-Jude series). Most of the soils in the study area (65.9%) are characterized by low P content (e.g. Saint-Aimé series). Soils with moderate P content (11.7%) are usually clayey gleysols in the “neutral” reaction class (e.g. Saint-Urbain series).

Table 1. Definition of P content classes in the A horizon

Class	P (ppm) Bray P2	P (kg/ha) Bray P2	P (ppm) Melhich P3	P (kg/ha) Melhich P3	Percentage of area
Very low	<45	<100	<21	<48	22.2
Low	45 - 90	100 - 200	21 - 57	48 - 127	65.9
Moderate	90 - 135	200 - 300	57 - 92	127 - 206	11.7
High	135 - 180	300 - 400	92 - 127	206 - 285	nil
Very high	≥180	≥400	≥127	≥285	0.2

(Martin and Nolin 1991)

As is also the case with other fertility characteristics, local conditions may be quite different from the general trend described here. Other factors also affect a soil's available P content, including land use. In regions where there are many industrial-scale livestock operations, for example, soils tend to be very rich in phosphorus because of the application of manure in quantities exceeding the P requirements of the crops grown, having regard to soil productivity.

A soil's available P content is often inversely proportional to its P-fixing capacity. Furthermore, the lower the P-fixing capacity, the greater the risk of soluble phosphorus migration, especially in soils with a high P content as a result of overfertilization. In Quebec, a good deal of attention has been devoted to the matter of soil available P content in recent years, because phosphate compounds degrade surface water quality by contributing to eutrophication (Lavoie et al. 1995). Research currently under way is expected to yield a technique for classifying soils on the basis of specific phosphorus-fixing capacity in the near future.