



Recent evolution and trends in the soil fertility of Flemish strawberry fields

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The Soil Service of Belgium (SSB, spin-off of the KULeuven) formulates each year hundreds of fertilization recommendations based on soil analyses in strawberry in open field. Soil samples are taken in the ploughing layer (0-30 cm) in order to determine the soil fertility (pH, C, P, K, Mg). In the last 5 years (2006-2012), SSB determined the soil fertility of more than 2000 soil samples from fields with different strawberry varieties (June bearing, late season varieties, everbearing varieties, strawberry breeding). In this contribution, the statistics and trends of the soil fertility will be discussed for the different strawberry varieties. Statistics are shown for sand, silt loam and silt which are the main soil types on which strawberries are cultivated in Flanders, Belgium.

Table 1 Number of soil samples in strawberry fields taken during 2006-2012

	Sandy soils	Silt, Silt loam soils
Everbearing		182
Late season	409	127
June bearing	599	893
Strawberry breeding	63	

The soil samples presented are taken between 2006 and 2012 just before or slightly after planting. In some cases an organic fertilization (manure) was carried out before soil sampling, mineral fertilization was mainly done after soil sampling. Soil fertility in strawberry fields is determined by the SSB based on a soil analysis of a representative soil sample of the upper soil layer (0-30 cm). In this analysis the parameters that are important for overall soil fertility are determined: soil texture (soil type), pH, C-content, content of P, K, and Mg. Soil texture is determined by palpation. pH is measured in a KCl-solution. C-content is determined with the modified Walkley & Black method and is expressed in %. The elements P, K and Mg are extracted in ammonium lactate (A.L.-extract) and then determined by Inductively Coupled Plasma (ICP). They are expressed in mg/100 dry soil.

Soil fertility in strawberry fields

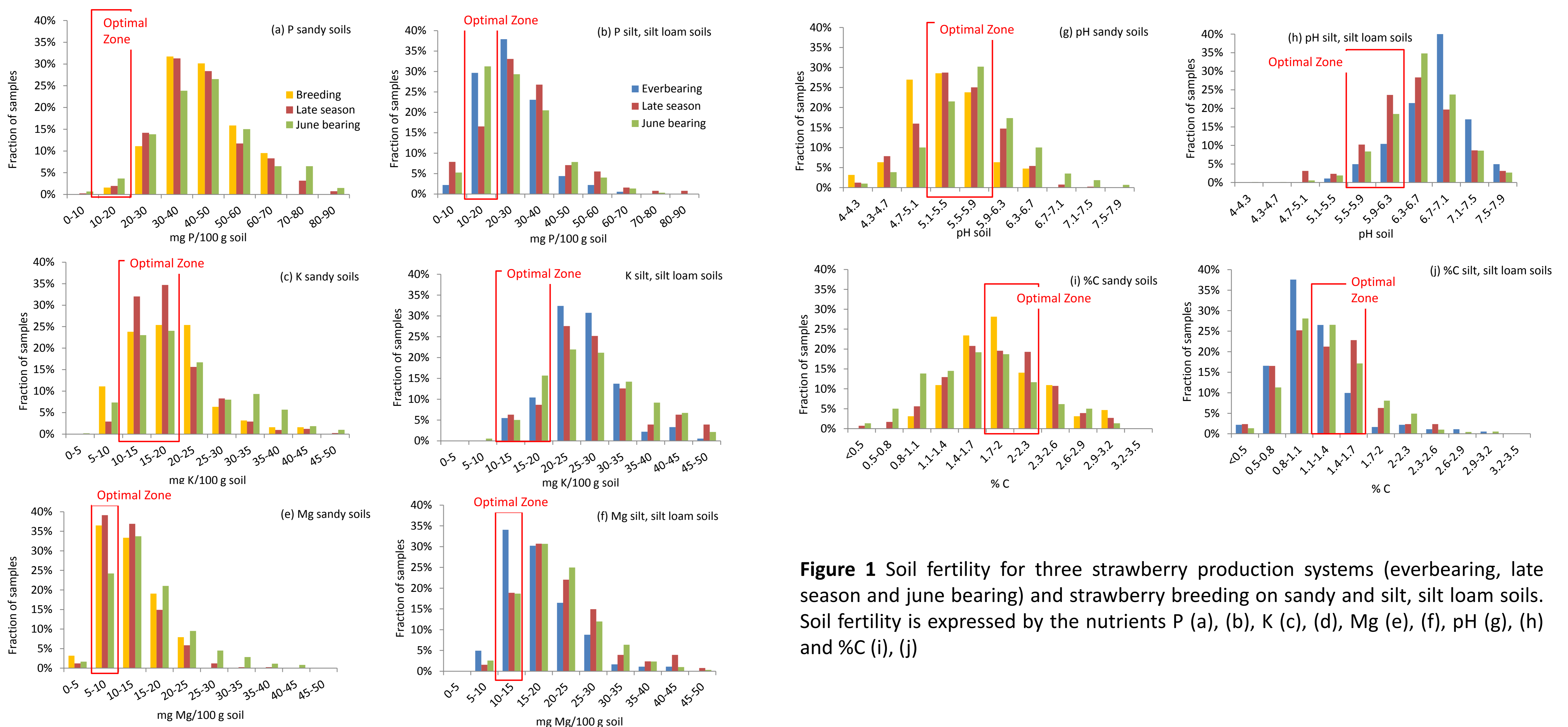


Figure 1 Soil fertility for three strawberry production systems (everbearing, late season and June bearing) and strawberry breeding on sandy and silt, silt loam soils. Soil fertility is expressed by the nutrients P (a), (b), K (c), (d), Mg (e), (f), pH (g), (h) and %C (i), (j)

In general no clear distinction could be made in soil fertility between the different strawberry production systems (Fig. 1). In the sandy soils nor in the silt, silt loam soils the concentration of P, K, Mg, pH and %C differed between the different varieties. In relation to soil texture however there was a discrepancy between the sandy and silty soils. In the sandy soils the concentration of P was higher compared to the silt, silt loam soils (Fig. 1 a, b) while K and Mg were higher for the silt and silt loam soils (Fig. 1 c, d, e, f). The pH of the silt, silt loam soils was higher and %C of these soils was lower (Fig 1. g, h, i, j). Within each texture class there was a quite big differentiation in each parameter, only the Mg concentration in the sandy soils was strongly concentrated between 5 and 20 mg/ 100 g dry soil.

In order to interpret the analysis results, SSB relies on soil fertility classes for the different soil fertility variables related to the agricultural standards of optimal plant growth. The agricultural standards provide a clear and interpretable reference. The soil fertility classes are based on extensive field research combined with 65 years of experience in the agricultural and horticultural sector.

- On the sandy soils the P concentration was far above the optimal zone on the majority of the samples. In the silt, silt loam soils approximately 25% of the samples was situated in the optimal zone.
- The K concentration was for approximately 50% of the samples within the optimal zone for the sandy soils and only 15 to 20% for the silt, silt loam soils.
- For the Mg concentration approximately 25 % of the samples is situated in the optimal zone for the silt, silt loam soils while 35% for the sandy soils.
- In the silt, silt loam soils the pH is higher than the optimal zone in approximately 70% of the samples. In the sandy soils the pH is slightly lower but still 50% of the samples lies in the optimal zone .
- The sandy and silty soils are comparable regarding %C. In both soil types 40% of the samples is situated in the optimal zone but in both soils in 40% of the samples %C is still lower than the optimal zone.

Conclusion

The results above are discussed in function of the soil texture and in relation to the optimal zone. The discussion indicates that Mg, K and P are abundantly present in the soil. The C concentration is in general close to the reference zone just as the pH. The results indicate that excessive fertilization is not necessary in strawberry fields. In essence fertilizers could be saved since the concentration of nutrients is above the reference zone.