

RELATION BETWEEN HYDRAULIC CONDUCTIVITY AND DRAINABLE POROSITY BY « IN SITU » METHOD OF MEASUREMENT

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The "in situ" method called "well and Piezometers" is used to determine the horizontal hydraulic Conductivity (K) and the Drainable Porosity (μ) of the soils, for drain spacing calculation.

This measurement represents a full-size simulation of the drainable effect when the water-table is lowered, by pumping in a well (1 m depth).

From a great number of measurements in France, it is possible to carry out a statistical analysis in order to the best relationship between K and μ .

A direct comparison between the K values and the clay content of the layer where the top of the water table is situated shows that K can take any value when there is less than 15 % of clay content. Above this percentage K cannot exceed one meter per day (fig. 2).

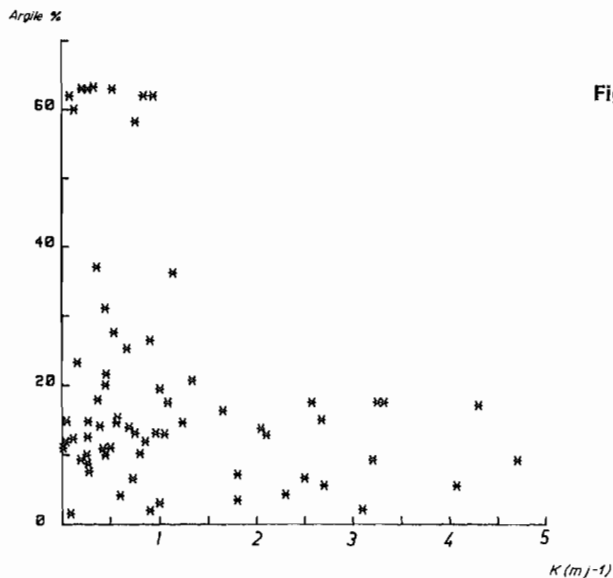


Figure 2 : Relation between the H.C. and the clay rate at the level of the lowering water table.

The statistical analysis gives different relationships for different clay content (A).

For all the values (N = 67, $r = 0,33$ ***)

$$\mu = 0,025 + 0,006 K \quad (\text{fig. 4})$$

For $A < 15\%$ (N = 38, $r = 0,47$ **)

$$\mu = 0,0153 + 0,017 K^{0,5}$$

For $15 < A < 30\%$ (N = 17, $r = 0,44$ *)

$$\mu = 0,033 K^{0,289}$$

For $A > 30\%$ (N = 12)

No relation

significant

** Highly significant

*** very Highly significant

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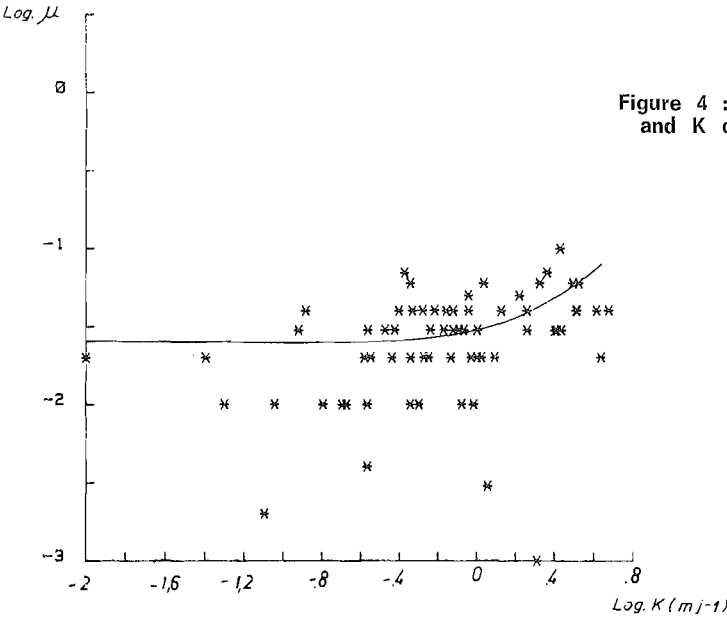


Figure 4 : Relation between μ and K on the whole points.

Drainable Porosity studies in the USA show that it is static value in agreement with the moisture content at the field capacity. In France, the Drainable Porosity is a dynamic value which represents only a small fraction of the macroporosity (between half and a quarter of this value) (fig. 7).

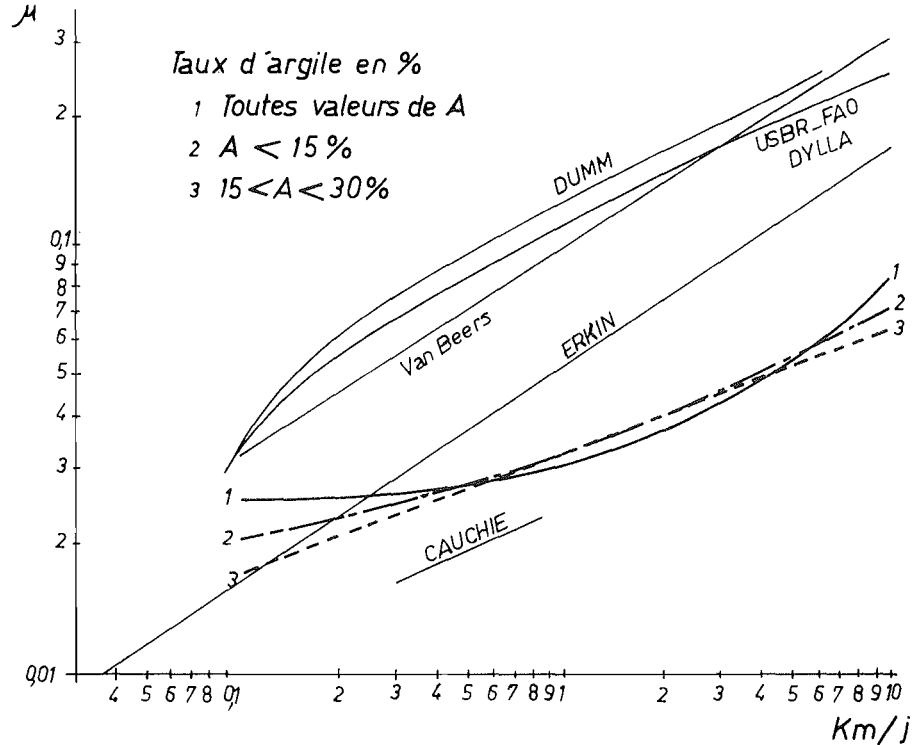


Figure 7 : Graph plotting all the curves mentioned with respect to the relationship $\mu = f(K)$.