The use of resistograph F-400 and the processing of data :

a case study.

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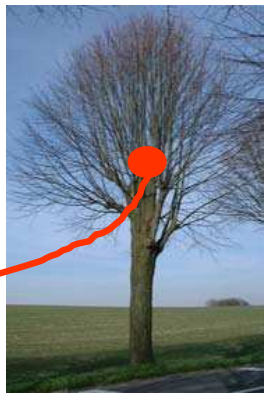
1. The case : 280 limes (*Tilia cordata* and *T. europea*) were drastically pruned in 1992.

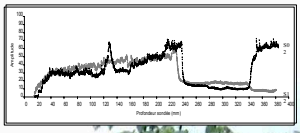
In 2002, an experimentation was started to test the efficiency of several soil treatments in increasing vitality, but also to assess the problems of wounds and cavities. Numerous 10 years old wounds are now presenting rots and cavities. An important question is: on which objective base can we choose the sprouts to be maintained ? One of the included parameters could be the width of healthy wood on which sprouts are anchored. This width can be assessed visually, but other techniques were proposed, namely the use of a resistograph to measure wood density variations.

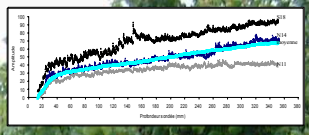


2. The interpretation of resistograms.

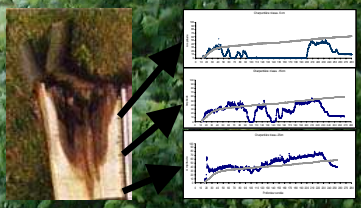
Resistogram gives a relative measurement of wood density that is expressed as a percentage of amplitude. Apart from cavity localisation, there can be doubts in the interpretation of some amplitude variations.

A first step is to compare measured signal to the mean amplitude calculated with 50 healthy limes (98 measurements without cavity). This mean curve gives a qualitative and quantitative comparison point to interpret the amplitude of each resistogram. The weakness of wood can be calculated as the relative amplitude loss (RAL) against this mean curve. Two RAL critical levels were determined as corresponding to transitions of decayed wood (RAL>20%) and cavity (RAL>80%).

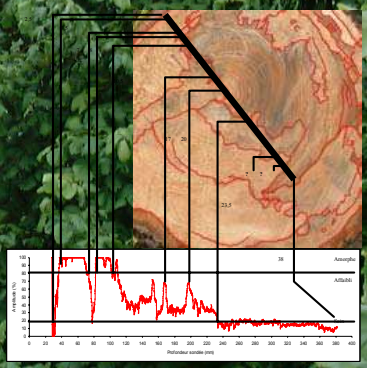




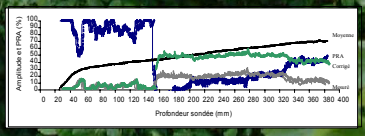
3. A second step is sometimes necessary because, an artifact occurs in the measurement of wood density when a cavity is crossed. This was illustrated by the comparison of several resistograms taken at 5 cm intervals. The wider is the cavity, the more important the apparent loss of amplitude at the end of the corresponding measurement. Nevertheless, wood is healthy at these three stages as tree has compartmentalised the rot. So, there is an artifact in the measurement of wood density related to the width of the crossed cavity. If a second measurement is not realised, corrections have to be made to the signal.



4. RAL determination was applied on a decaying lime presenting *Ganoderma* contamination at the trunk base. Graph presents this RAL calculated from the comparison of the measured resistogram and the mean curve. The two RAL critical levels are also used to qualify the relative importance of fungal degradation. Coincidence between calculated results and the observations on wood piece are shown on the figure. Two observed limits aren't revealed by the resistograph and a RAL maximum doesn't correspond to any observable transition.



5. RAL calculation and signal correction are combined in an example. Resistograph is there crossing a cavity formed by *Ganoderma* on the external part of the trunk. Without correction, the density of wood remaining in the central zone could be under-estimated. Similar problems could be important for risk assessment and tree management.



Conclusion:

There are still some questions about the use of resistograph in the assessment of wood zonation and its contribution in tree stability. Transitions between zones of different density are correctly pointed on resistogram. Nevertheless, some corrections are necessary to better assess the real wood density, particularly in the presence of cavities. Other technologies could be prefered, such as the use of tomograph.