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BEHAVIOUR OF SOME FOREST TREE SPECIES ON TEMPORARY WATERLOGGED SOILS

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This article makes a general and brief survey of researches designed to help utilisation of temporary waterlogged soils in forest.

Oak, which is the main tree species on these soils, often is very hard to regenerate there. It has been shown on acid pseudogleys that the main factor responsable for the seedings death was grass competition, especially by *Molinia coerulea* L. (Moench.) and *Carex brizoides* L. On the other hand, these waterlogged soils, with very little nutrients content, a coarse texture, and a low available water holding capacity, aren't suitable for the pedunculate oak, however very common there : the adults may decline as a consequence of climatic dryness, and their growth always is much lower than that of the sessile oak, whose ecology is much more suitable to these sites. As for the red oak, its behaviour is satisfactory on coarse textured waterlogged soils, but not on fine textured one. Results of plantation experiments on pelosols-pseudogley show the effect of a ridding on the pedunculate oak growth (fig. 1).

In controlled conditions, young pedunculate oak plants facing a quite shallow watertable behave well, a little better than sessile oak. Red oak plants are very flood-intolerant in loamy waterlogged soil. The pedonculate oak develops very clear adaptations in is roots system, particularly a production of " adapted " roots with high porosity (fig. 2) and important hypertrophy of lenticels (fig. 3) ; the red oak doesn't develop these adaptations.

Researches have also been done on coniferous species. A site-nutrition-production study, done on Norway spruce on waterlogged soils in the N.E. of France, has shown a quantitative link between production descreasing and soil clay content, soil structure instability index, and the level reached by the water-table.

Results of plantation experiments on typical pseudogley and pelosol-pseudogley with and without various drainage modalities, on different species, enable to give advice for afforestation of these two types of waterlogged soils (fig. 4).

Experiments in controlled conditions result in a classification of some coniferous species according to their resistance to waterlogging (Western red Cedar $\geqslant$ Lodgepole pine $>$ Scots pine $\geqslant$ Laricio pine (var. Calabrica) $>$ Norway spruce $>$ European larch $>$ Douglas fir $\simeq$ Grand fir) ; roots reactions of these species to waterlogging explain their aerial behaviour differences. It also has been shown that, and explained why, a shallow waterlogging very quickly causes nitrogen deficiency in the Norway spruce, and if it continued, could result in the plants death because of an important decreasing of their water basic potential (fig. 5).

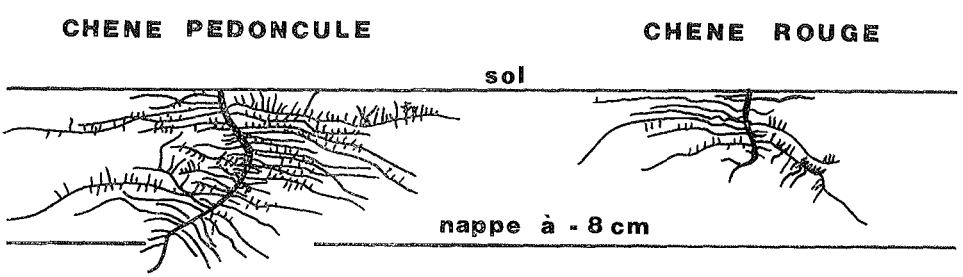

Figure 2 : Effect of flooding for 2 months on root system of *Quercus robur* (left) and *Quercus borealis* (right) seedlings. (2 month-old seedlings).

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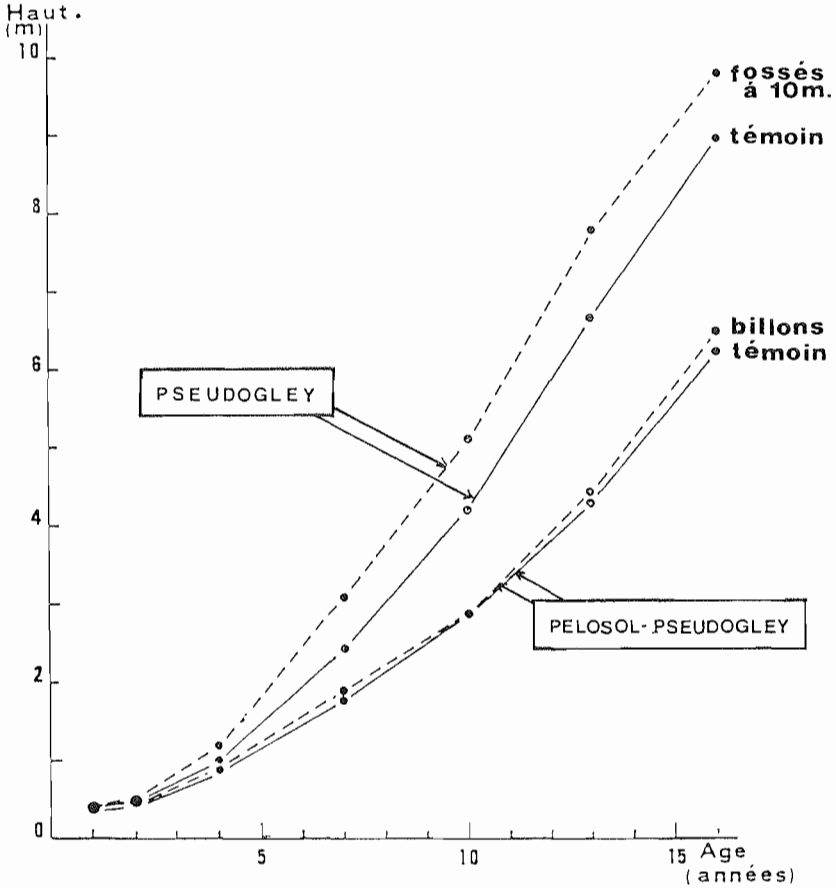

Figure 4 : Norway spruce growth on pseudogley and pelosol-pseydogley.

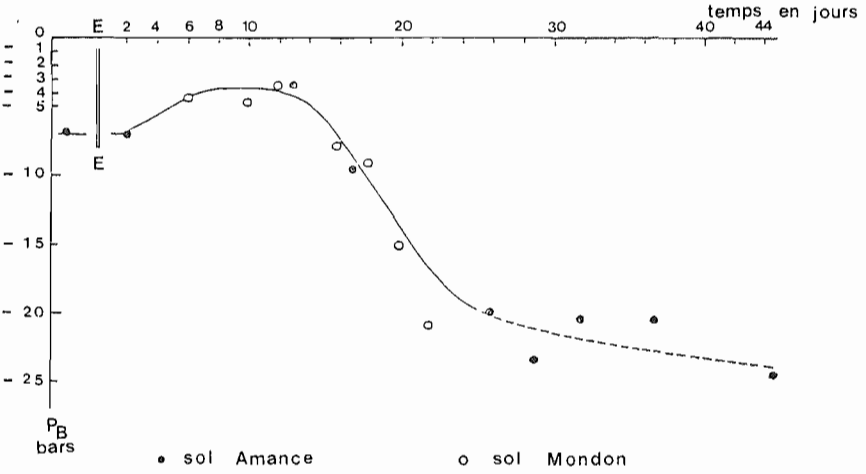

Figure 5 : Evolution of basic potential (P_B) as a function of time on Norway spruce, after beginning of waterlogging (E), in stagnant surface water-table conditions (from GRANIER and LEVY, 1981) (the broken part of the curve correspond to less precise measures when potentials are very low).