

EFFECTS OF MANAGEMENT SYSTEMS ON THE SOIL DENSITY OF A
LOWLAND SOIL EVALUATED BY THE GAMMA-RAY COMPUTED
TOMOGRAPHY

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During the last years, studies have been carried out for studying the changes of different management systems on soil physical attributes, particularly, in long-term experiments due the raising concerns about the environment. In many situations, traditional methodologies do not have enough precision and adequate resolution for evaluating soil variables as soil density. In some cases, it is difficult to know the difference among treatments or changes on soil attributes along the time, especially when they are small. Gamma-ray computed tomography is a powerful tool for studies of the soil density spatial distribution because it produces inside images from soil samples identifying, for example, thin compacted layers in details. Despite these advantages, the practical application of this method is not widely applied yet. The objective of this work was to evaluate the effects of different cultivation systems (conventional and no-tillage) on soil density of a lowland soil (Albaqualf) cores, in a long-term experiment. The experimental area is situated in Pelotas, RS, Brazil, belonging to the Embrapa Clima Temperado. The 19-year treatments consisted of: T1 (one year of rice (*Oryza sativa* L.) cultivated under conventional tillage followed by two years under fallow); T2 (continuous rice cultivated under conventional tillage); T3 (rice and soybean (*Glicine Max* L.) rotation cultivated under conventional tillage); T4 (soybean, corn (*Zea maiz* L.) and rice rotation cultivated under conventional tillage); T5 (rye-grass (*Lolium multiflorum* L.) and rice cultivated under no-tillage succession); T6 (soybean cultivated under conventional tillage and rice cultivated under no-tillage rotation); and T7 (control treatment, no cultivated soil). It was concluded that the Gamma-ray method allowed the identification of soil surface sealing (0.005 to 0.02m), mainly for the T1, T3, T4 and T6 treatments. For the T1, T2, T3 and T4 treatments, a 0.08 to 0.14m soil compacted layer was identified (called plow pan layer), when compared to the T7 treatment. In the 0.04 to 0.08m soil layer, all treatments showed low or similar soil density values in relation to T7 treatment.