

Modelised tritium free water tissue vs experimentation: the key to organically bounded tritium consideration

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Because Organically Bounded Tritium (OBT) is synthesised from tritium free water and mainly through photosynthesis processes, it's firstly needed to understand and modelise as well as possible tritium concentration in plant's water.

We have improved available model developed by CEA in regard to determined and controlled experimentations on a current edible vegetal. In this article, equations used for modelisation are developed, and conditions for experimentations are strictly defined and controlled.

For experimentations, since lettuces have been watered only with tritium free water tritium, integration by leaves has been favoured.

Considering both air and soil contribution, the ratio between TFWT (Tritium Free Water Tissue) given by model and the measured one is surrounding one. Results show that tritium concentration in air is twice higher than the concentration measured in tissue free water of plant. This result is explain by the fact that the average of tritium intake from air by leaves is range from 15 % to 20 % to the final TFWT tritium concentration, while the average of soil contribution to the final TFWT concentration is 30 to 40 %. This shows that tritium integration by root is surely the main process even if tritium intake by leaves is faraway to be negligible. This is mainly true if we take into account young, mature or old plants because specific leaves area and roots size are quite different.

OBT formation has been also investigated. In this study we proposed a new approach of Calvin cycle considering two steps: the first one dealing with water's photolysis and using mainly water brings by roots, the second one for carbohydrate transformation and associated to available water brings through stomata. This is strongly relevant with the ratio observed between measured OBT and tritium concentration in air for any experimentation.