

ANALYSIS AND MODELLING OF FOLIAR TRANSFER PROCESSES OF RADIONUCLIDES IN PARTICULATE FORM TO PLANTS

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Context and problematic

normal/incidental releases from nuclear facilities

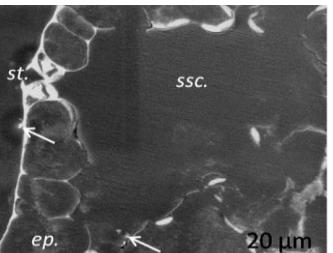
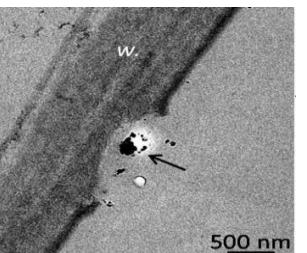
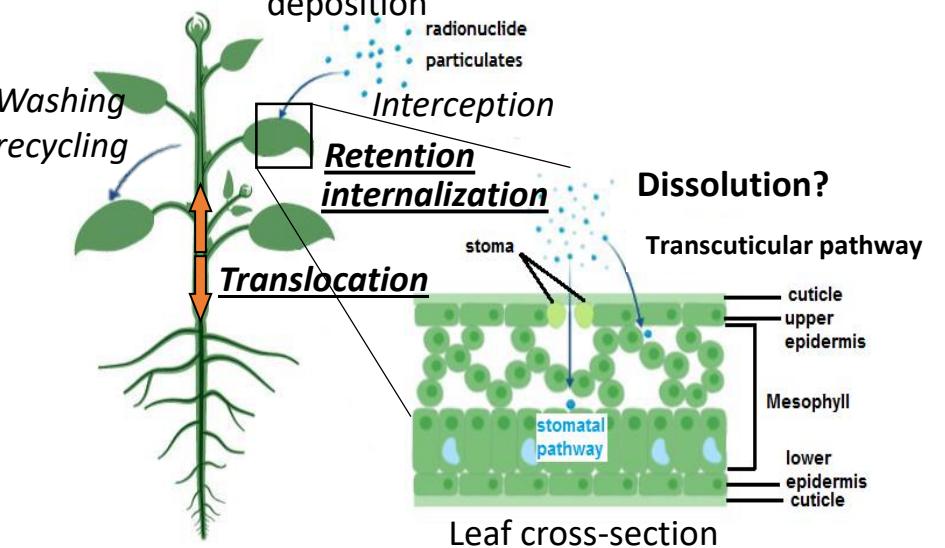
- ✓ Gases
- ✓ Particles
- ✓ dissolved RN



future particle releases from installation (UNG, ITER) require improved transfer assessment

- ✓ Lack of data on radioactive particle behavior and gaps of knowledge on some processes (internalization...)
- ✓ Foliar transfer models do not consider particle source term

Foliar Route (Dry/Wet deposit)



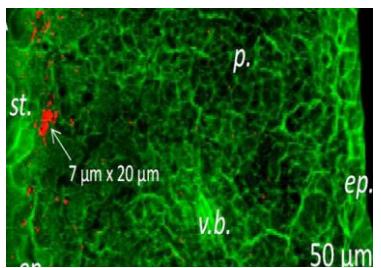
- TiO₂-NP transfer by transcuticular pathway (TEM) and stomatal pathway (SEM) respectively, by Larue et al. (2014)

Goals

- ✓ Acquire experimental data on post-deposition processes of particles transfer.
- ✓ Review existing foliar transfer models.
- ✓ Assess the need of a dedicated particulate sub-model.

Methods

- ✓ Transfer experiments varying main parameters influencing transfer : particle size, solubility and state of the plant leaf surface (size, roughness, density of hairs or stomata...Fig 1).
- ✓ combination of techniques to analyze, localize (Fig 2) and quantify fluxes (TEM-EDX, XRF, ICP-MS,...)



- Fig 1: SEM of Stomata and trichromes by Li et al. (2018)
- Fig 2: SR-µXRF localization of TiO₂ by Larue et al. (2014)

- ✓ Models/measures comparisons (literature and new experimental data, particulate vs other source terms).