



#### Riparian agroforestry systems - the role of biodiversity in soil carbon sequestration

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Riparian agroforestry buffers represent unique ecotones within agricultural landscapes which can be managed to improve ecosystem services provisioning. While many riparian buffers are left fallow, there is a growing interest in their agroforestry potential, as the inclusion of trees increases carbon (C) sequestration potential and nutrient cycling. These services are inherently tied to the functional traits of the tree and understorey plant community, yet there is very little information on plant community diversity and its role in soil C storage in these critical transition zones. Drawing on a network of established riparian buffers within southern Ontario, Canada, including a rehabilitated deciduous agroforest, a mature coniferous agroforest and a grassland buffer, we collected litter from plant communities with significantly different leaf trait syndromes for use in a 95-day incubation experiment. We determined the litter vs soil-derived portions of C-CO<sub>2</sub> by analyzing gas samples for CO<sub>2</sub> concentration and  $\delta^{13}C$  on a Picaro G2131-i. We found significantly different rates of total C-CO<sub>2</sub> between litter treatments. Notably, the agroforestry treatments resulted in lower cumulative C loss over a 95-day incubation period compared to the grassland treatment. The coordination of leaf functional trait syndromes on C loss (litter vs soil derived) and the importance of species mixing in agroforestry systems on C dynamics will be presented. To our knowledge, this is one of the first litter decomposition studies to track soil and litter-derived C using mixed species incubations and provides an important step in understanding critical but unknown aspects of soil C cycling and storage in agroforestry systems of high plant community complexity and diversity.