Summary

* Plant-soil microbe interactions, or plant-soil feedbacks (PSFs), have profound impacts on plant community dynamics and have received increasing popularity over the past two decades.
* Most PSF experiments assume instantaneous and constant microbial effects throughout plant development without a time lag between soil conditioning and plant response. However, growing studies have begun to recognize the importance of time in plant-soil microbe interactions.
* Durations of conditioning and response phase as well as the timing of interactions at certain plant developmental stages can influence the outcomes of plant growth and biomass. Moreover, microbial communities may continue to change after the senescence of conditioning plants, thus leading to alterations of the strength and direction of microbial effects on succeeding responding plants.
* Besides biomass-based performance, microbial effects can have demographic consequences for plants, affecting seed germination rate and timing, seedling survival, and flowering phenology.
* By integrating temporal dimensions of plant-soil microbe interactions and the demographic effects into theoretical models and parameterizing these models with empirical results, we envisage a better prediction of long-term dynamics of plant-soil microbe interactions in natural contexts.