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 over the development of plants without a time lag between soil conditioning and plant response.
* However, growing studies have begun to recognize the importance of temporal aspects in plant-soil microbe interactions.
* Different durations of soil conditioning and responses as well as the timing of interactions throughout plant developmental process can yield distinct outcomes of plant growth and biomass.
* Moreover, microbial effects can change after plant death.
* 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.