



AGROECOLOGY FOR WEEDS

Practice Abstract N° 31

Impact of legume and mixed cover crops on soil nitrogen cycling in Mediterranean vineyards

INTRODUCTION

Cover crops contribute to weed suppression in sustainable farming systems while improving soil health, with their effectiveness influenced by soil properties such as texture, organic matter, pH, and nutrient availability. This study evaluated the impact of 3 cover crops (*Vicia faba* L. *minor*, *Trifolium alexandrinum* L., and a *Vicia villosa* Roth. + *Avena sativa* L. mixture) - compared with weedy and mechanical controls - on soil N-cycle microorganisms in Mediterranean vineyards of Southern Italy (Calabria).

MAIN RESULTS – OUTCOMES

- Mixed cover crops appear to be the most effective overall**, combining the benefits of species diversity with higher total N accumulation across management regimes (Fig. 1).
- RT-PCR results (Fig. 2) indicate that *T. alexandrinum* and *V. faba minor*, particularly for nifH, **enhance N-fixing microbial activity, as shown by lower Ct values**.

PRACTICAL RECOMMENDATIONS

- Adopt mixed-species cover crop systems** where feasible, as they provide more consistent soil total N accumulation across both organic and conventional management.
- Prioritize legume species** with demonstrated stimulation of microbial activity to support active N-fixing communities and sustain long-term soil biological fertility.
- In organic systems, leverage legume-rich or mixed cover crops as a primary strategy** for maintaining adequate N supply and enhancing microbial-driven nutrient cycling.

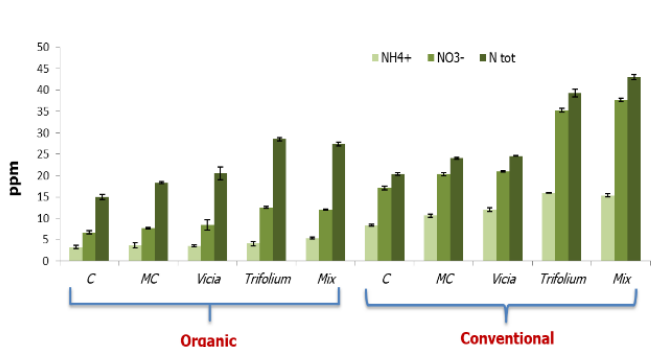


Figure 1. Effect of cultivation system and weed control management on soil NH₄⁺, NO₃⁻ and their sum (N_{TOT}). Each bar means ± standard deviation (n=3).

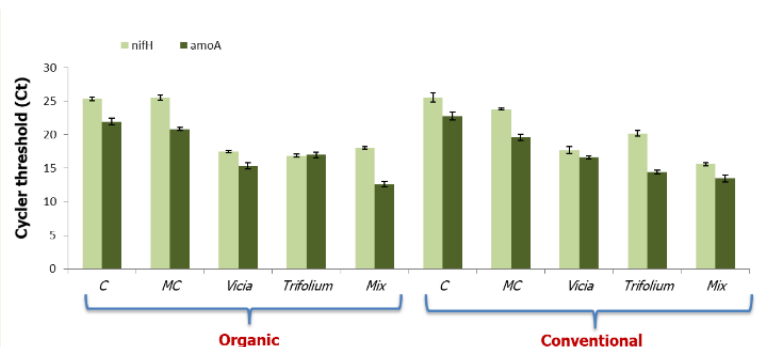


Figure 2. Effect of cultivation system and weed control management on nifH and amoA genes in soil samples. Each bar means ± standard deviation (n=3).



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