

Can weed management in vegetable systems be improved by cover crop species mixtures? Step 2: field implementation (198)

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Cover crops are a fundamental tool for weed control, especially in organic and low input farming. Species with different functional traits can be combined in mixtures to enhance weed suppression. Our aim was to test the relative importance of functional diversity and functional composition (i.e. complementarity) in improving and stabilising the agroecosystem services expected from cover crops.

Following a preliminary screening on cover crop functional traits (Step 1), we identified 8 species belonging to 4 functional groups: large seeded legumes, characterized by higher height (*Pisum sativum* L., *Vicia sativa* L.), small seeded legumes, able to cover quickly the soil (*Trifolium incarnatum* L., *T. squarrosum* L.), highly competitive grasses (*Hordeum vulgare* L., *Avena sativa* L.) and allelopathic brassicas (*Raphanus sativus* L., *Brassica nigra* L.).

We designed 4 two-species mixtures, 4 four-species mixtures and 1 eighth-species mixtures and set a gradient of diversity: (i) pure stands; (ii) co-presence of 2 functional groups; (iii) diversity within 2 co-occurring functional groups, (iv) co-presence of 4 functional groups, (v) diversity within 4 co-occurring functional groups. The trial was conducted in an organic field located in Pisa, Italy. Experimental plots were seeded on 27 October 2014 following a randomized complete block design with three replicates, and devitalized on 6 May 2015. Weed biomass was significantly lower in mixtures with the higher level of diversity compared to the unweeded control (from -87% up to -97%). Cover crop mixtures proved to be more productive than pure stands, since Land Equivalent Ratio was >1 in all but one mixture. For some species, biomass production was higher in high diversity mixtures compared to pure stands.

Functional diversity in cover crops can play a key role on biomass productivity and weed suppression. Data will be analysed to clarify the role of functional composition on cover crops agroecosystem services provision.

Keywords: Cover crop, mixtures, functional diversity, weed suppression

