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CAN WEED MANAGEMENT IN VEGETABLE SYSTEMS BE IMPROVED BY COVER CROP SPECIES MIXTURES? STEP 1: SCREENING OF COVER CROP SPECIES AND VARIETIES

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Cover crops are an essential strategy in organic and low input arable and vegetable production, especially regarding weed reduction and N use efficiency, but their establishment and development can be unstable. A viable option to enhance and stabilise the agroecosystem services provided by cover crops is to sow mixtures of species having different functionality. Such mixtures have been reported to increase productivity, stability, resilience and resource use efficiency of cover crop communities. Therefore, our hypothesis is that weed reduction can also be improved by cover crops mixtures. However, it is not yet clear how diversity drives these mechanisms in arable and vegetable systems in Mediterranean climates.

Three experiments has been set, comprising (i) a growth chamber essay, including a germination test, (ii) a field experiment testing cover crops mixtures preceding an organic aubergine (*Solanum melongena* L.) crop, and (iii) a field catalogue. A total of 18 species are under study: 7 legumes, 6 *Brassicaceae* species, 4 *Graminaceae* and *Phacelia tanacetifolia* Benth (*Hydrophyllaceae*), represented by different cultivars, where available. In the present work only results from the first experiment will be shown.

To identify the species to include in the field experiment, cultivars of all 18 species were tested in the growth chamber essay. A RCB deign with 5 replicates was set. Phenology (BBCH scale) was measured three times a week. Above- and below-ground biomass, plant height and root length were measured 26 days after sowing. A Wilcoxon rank sum test was performed to compare cultivars performances. The orthogonal contrasts method was utilized to compare performances of species within families.

Significant differences were found between and within species, mainly in terms of above-ground biomass. Based on the results, we consider that functional groups should correspond to the botanical family. The family *Leguminosae* was split in two functional groups: large-seeded legumes, with faster development and higher biomass production, and small-seeded legumes. Therefore, eight candidate species and their relative cultivars were identified for the field experiment, based on higher biomass production, plant height, and extension of the root system as traits linked to good competitive ability. Species and cultivars not included in the field experiment will be grown in the field catalogue.

The field experiment will be arranged in a RCB with 3 replicates and 18 treatments. To test the relative importance of functional composition and functional diversity in improving and stabilising the agroecosystem services expected from cover crops, we designed 4 mixtures of 2, 4 mixtures of 4 and a mixture of 8 species to create 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.