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CROP DIVERSITY & AGRONOMY

Fertility building leys for crop production

Using legume-based mixtures to enhance nitrogen use efficiency

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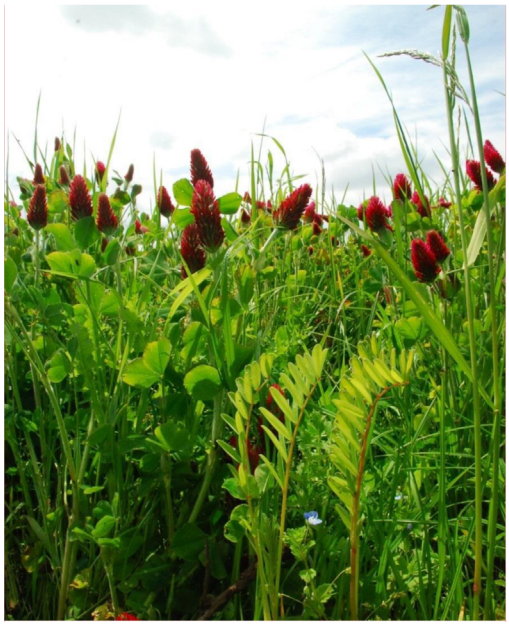
Soil fertility is the basis of organic farming and the principle means of building soil fertility is through the use of leguminous leys, in rotation with crops. The selection, diversity and management of appropriate forage mixtures including legumes, grasses and herbs has a major influence, not only on the yield of the ley and the crop but also on resilience to variable environmental conditions and wider wildlife populations. Also see: Research Digest no. 7 "Multispecies leys - Selection and management to support pollinators".

Not surprisingly different plant species affect soil fertility in different ways; the LegLINK project identified the main characteristics of the principal legume and grass species. There are several plant characteristics that have an impact on nitrogen release and mobilisation, namely: high C:N ratio, lignin and possibly polyphenol content. All of which result in slower N release, and potentially lower N losses and better utilisation.



Leguminous leys are the cornerstone of most organic systems, whether they are used for grazing, conservation or mulching

The research showed the benefits of diverse mixtures over simple two-way mixtures or monocultures. In the project, the "All species mixture" (16 species) was more productive than the farmer's own mixtures. However, modelling work showed that the species composition of optimal multifunctional mixtures would be site-dependent, highlighting the need to develop mixtures adapted to specific conditions.

Overall, the best multifunctional mixtures were found to contain Black Medic, Lucerne and Red Clover. There are benefits from the inclusion of grass species, but the correct balance of grass and legumes is important. The grass takes up the N fixed by the legumes and reduces the free N in the soil, the legume rhizobia respond to the lower soil N levels and fix more N, resulting in higher overall N fixation and hence greater biomass. In addition, the grass raises the C:N ratio, prolonging the release of N to subsequent crops. In LegLINK, above ground yield of the ley was found to be positively associated with subsequent crop yield.

FURTHER READING

1. ORC Factsheet no. 6 (2021) tinyurl.com/34d6fjye
2. Döring *et al.* (2012) tinyurl.com/m44hm79c
3. Döring and Winkler (2013) tinyurl.com/yruufckj

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