

# Diverse fertility building leys in arable rotations

## Problem

Leguminous leys are a cornerstone of organic arable systems. However, they do not always deliver reliably, and there is a need to improve their fertility-building capability and resilience. A typical ley of one or two legume and grass species can be vulnerable to failure under unfavourable conditions. Good establishment, weed suppression and controlling the quantity and timing of N release can be especially challenging.

## Solution

Different legume species have different growth characteristics and nutrient use profiles. Growing a complex mixture of species can maximise the exploitation of nutrients, aid weed suppression, attract a more diverse range of pollinators and enhance the stability and resilience of the stand. On-farm and field trials (including trials as part of the three year LegLINK project) have evaluated the role of functionally diverse species-rich leys in arable rotations in the UK.

## Outcome

The results of a three year study in the UK suggest that there are several advantages to more complex mixtures;

- Greater **resilience** to variable conditions
- Combine early and late **weed suppression**
- **Slower decomposition** on incorporation
- Extends **forage availability** for key insect pollinators
- Generally achieve **higher forage yields**
- Potential for higher subsequent crop yields.

## Practical recommendation

- There are a number of plant characteristics that have an impact on **nitrogen release and mobilisation**, namely **C:N ratio, lignin and polyphenol content** which result in slower N release and lower N losses or better N utilisation.
- **Including grass species** in the mix takes up the N fixed by the legumes and reduces the free N in the soil; the rhizobia bacteria respond to the low soil N, resulting in **higher N fixation and greater biomass**. Moreover the higher C:N ratio **prolongs the release of N** to subsequent crops. The balance of grass and legumes is important.
- The **annual N accumulation of ley mixtures decreases after two years**, although there may be other advantages from longer leys such as **weed control**.
- In terms of forage yield including a **3<sup>rd</sup> or 4<sup>th</sup> legume is generally advantageous**.
- The best multifunctional mixtures contain one or more species of Black Medic, Lucerne and Red Clover, plus other legumes according to the circumstances.

## Applicability box

### Theme

Soil quality and fertility, Nutrient management, Pest and disease control, Weed management.

### Geographical coverage

Europe-wide

### Application time

Sowing in spring or late summer as a 2 to 5 year break in the rotation before white straw cereals.

### Required time

Sowing

### Period of impact

Within ley, in succeeding crop and the following year

### Equipment

No specific equipment needed.



Figure 1: 'All species mix' of 14 legumes

	Forage yield	Yield of subsequent crop	Resistance to decomposition	Value for pollinators
Red clover	High	High		Significant
White clover	High	High		
Black medic	Moderate	High	High	Significant
Crimson Clover	High			High
Birdsfoot trefoil	Good	High		
Lucerne	High	High	High	Significant
Sainfoin	Moderate		High	Significant

Figure 2: Species with useful characteristics (data from LegLINK, 2014)

## Practical testing and sharing of the results

If this method seems to be suitable for your farm, we recommend that you test it under your own farm conditions.

Use the comment section on the [Farmknowledge platform](#) to share your experiences with other farmers, advisors and scientists! If you have any questions concerning the method, please contact the author of the practice abstract by e-mail.



## Further Information

### Video

- [Herbal Leys with Alex Joynson](#) (English), Cotswolds Seeds First Hand: A farmer from Wiltshire, UK, describes his experience of planting herbal leys on his farm.

### Further readings

- IOTA Technical Leaflet 7: [Fertility Building Leys](#)
- IOTA Technical Leaflet 10: [Sowing and management of multispecies leysto encourage pollinators](#)
- [Cotswolds Seeds: Herbal Leys](#)
- [HGCA/LegLINK \(2013\) Project Report No. 513 Using legume-based mixtures to enhance the nitrogen use efficiency and economic viability of cropping systems](#)
- [Grass-clover ley in Organic Rotations \(IBERS\)](#)
- [Modelling the ability of legumes to suppress weeds](#) (Storkey et al. 2011)
- [A win-win for legume mixtures](#) (Doring et al. 2011)

### Weblinks

- The OSCAR Cover Crops and Living Mulch Toolbox: [www.covercrops.eu](http://www.covercrops.eu)
- Check the [Farmknowledge Tool Database](#) for more practical recommendations.

## About this practice abstract and OK-Net Arable

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quality in organic arable cropping all over Europe.

**Project website:** [www.ok-net-arable.eu](http://www.ok-net-arable.eu)

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