

Fertility Building leys

Conclusions from the Leg Link project Using legume-based mixtures to enhance the nitrogen use efficiency and economic viability of cropping systems. (LegLINK)

Leguminous leys are the cornerstone of most organic systems, whether they are used for grazing, conservation or mulching. There are a number of key conclusions from the project that can be used to help formulate seeds mixtures, which should be adapted to suit the local conditions (pH, P, flooding/drought risk, soil type) and management (grazing, stock type, conservation, mulching) as well as other objectives of multi-functional farming (such as increasing insect pollinators):

1. There are several advantages to more complex mixtures over simple two-way mixtures or monocultures:

- Stability - provide greater resilience to variable weather, climate and management conditions
- They combine early and late weed suppression characteristics
- Slower decomposition and hence potentially better N utilization
- Extends forage availability for key insect pollinators.

2. In the project the “All species mixture” was more productive than the farmer’s own mixtures.

3. Above ground yield of the ley is linked positively to subsequent crop yield.

4. There are a number of plant characteristics that have an impact on nitrogen release and mobilization, namely high C:N ratio, lignin and possibly polyphenol content which result in slower N release and potentially lower N losses and better utilisation.

5. The following species have useful characteristics:

- Red clover: high yield, high yield of subsequent crop
- White clover: high yield, high yield of subsequent crop
- Black medic: moderately high yield in second year, resistance to decomposition (lignin content and C:N ratio), high yield of subsequent crop
- Birdsfoot trefoil: good yield, high yield of subsequent crop

- Lucerne: high yield, resistance to decomposition, high yield of subsequent crop. Prefers high pH.
- Sainfoin: moderate yield, resistance to decomposition (high polyphenols),
- Crimson clover: an annual with high yield, high value for pollinators.

6. In terms of forage yield including a 3rd or 4th Legume is generally advantageous

7. The best multifunctional mixtures contained Black Medic, Lucerne and Red clover.

8. Black Medic, Red clover, Sainfoin, Lucerne and Crimson Clover all significantly benefit bee and butterfly species, Crimson Clover primarily in the first year. This is advantage is regardless of management, except for sheep grazing, but changes in management can further enhance the benefits from these species.

9. There are benefits from the inclusion of grass species. The grass takes up the N fixed by the legumes and reduces the free N in the soil, the legume rhizobia respond to the low 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. The balance of grass and legumes is important.

10. The annual N accumulation of ley mixtures decreases after two years, although there may be other advantages from longer leys, such as weed control.

***Note:** Red clover is not suitable for tugging sheep, lucerne does not persist if grazed regularly. Trefoil, sainfoin and medic contain anti-bloating agents and help intestinal worm control. There is a risk that crimson clover will outgrow a cereal if undersown. Chicory could be included except where the ley is to be used for hay or big bale silage, due to the stalks. Lucerne requires additional cultivations to kill it effectively *prior to cropping*.*

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