

Using legume-based mixtures to enhance the nitrogen use efficiency and economic viability of cropping systems



Wakelyns
Agroforestry



Abacus organic
associates

Roger Wyarrrt
(Seeds) Ltd



Institute of Organic Training & Advice



Soil Association Certification Limited

Industry Pull

Improve nitrogen (N) use efficiency

Legume component characteristics and N management

Reduce environmental impact of N application

Increase resilience to climatic volatility



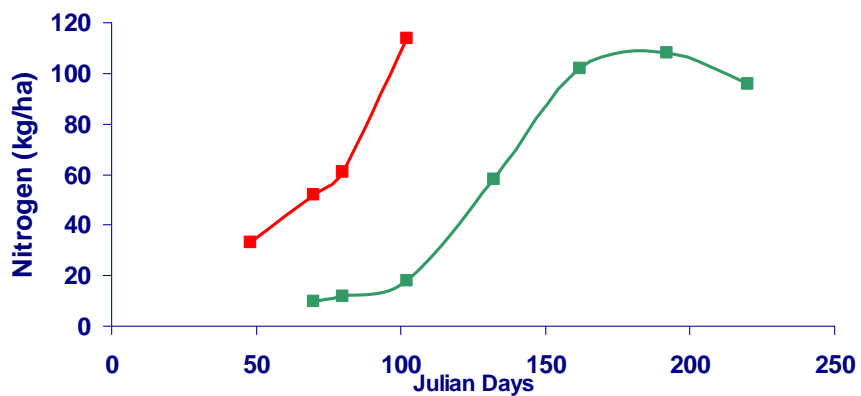


Production of
fertiliser-N needs
huge amounts of
energy

Biological N-fixation
is the least harmful
way to supply N to
agroecosystems

Soil N supply and crop demand are not synchronised

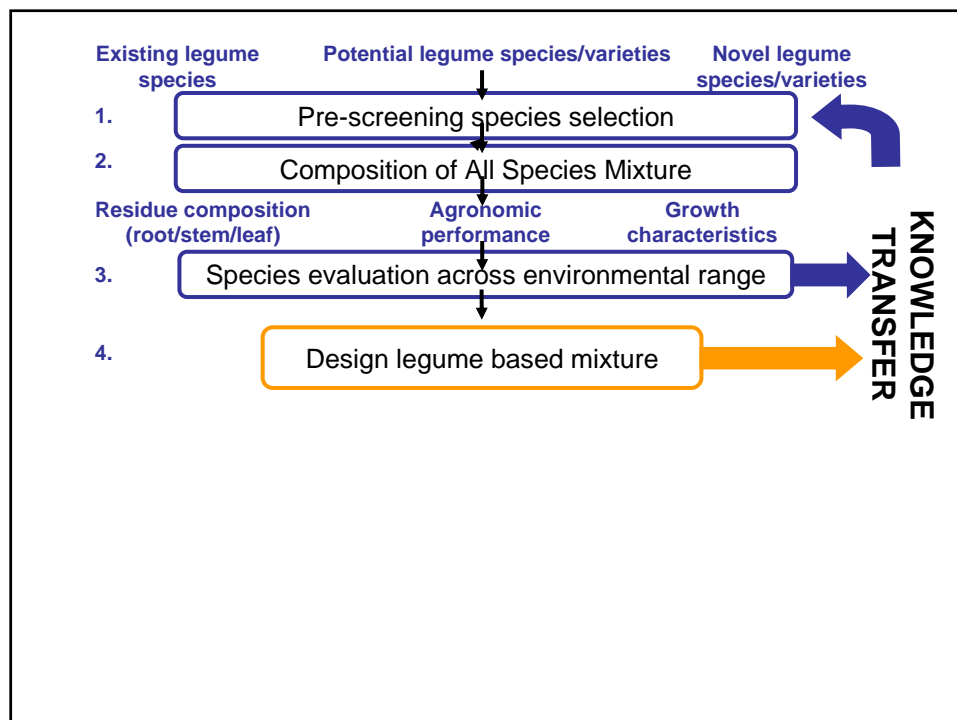
- Nitrate-N in soil (0-90cm) after February ploughing
- Crop N uptake in organically grown spring oats



Watson and Fowler, 1988

Research hypotheses

1. The residue composition (stems, leaves, roots) of different species of legumes vary
2. The composition of plant residues affects the relative breakdown of that plant material in the soil
3. A legume based mixture can provide stability of function in terms of residue composition across the UK climatic zone
4. Complex mixtures containing residues with slow, as well as fast, breakdown rates improve the performance of the arable rotation



3 Trial Sites 35 Farm Sites

- Participating Farmers Will:
 - Drill 0.5ha of the mixture alongside 'standard' legume fertility building crop in standard rotation according to standard practice.
 - If possible, allow us to place 4 exclusion cages across the strip if it is to be grazed.
 - Grow the crop for a minimum of 2 years.
 - Track progress with us and other participating farmers.

We will carry out the following assessments:

- Soil samples pre-drilling
- Soil samples prior to incorporation of the mixture and control leys
- Sequential monitoring for species presence and density
- Four replicated above ground samples of plant biomass of mixture and control leys will be taken after 18 (winter drilled) or 24 (spring drilled) months and assessed for quality.

Legume based mixtures

- Increased rotational productivity
- Improved agricultural profitability
- Improved soils
- Improved nitrogen use efficiency
- Reduced nitrogen pollution
- Commercial seed mixes
- Farmer tool for fertility management

