

Do pea, lupin and fababean contribute differently to N cycling in organic farming systems?

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Summary and conclusions

N cycling of three legumes was monitored in a network of eight farmer's plots followed over two years in the Pays de Loire (France). N contribution to soil did not differ significantly between species, neither across sites nor on a given plot. Values were low, around zero. Soil inorganic nitrogen represented the same amount either behind pea, lupin or fababean before and after the drainage period, and at harvest of the following crop.

Objectives

Grain legumes have the ability to meet their own demand for nitrogen through symbiotic N₂ fixation. Furthermore, a positive nitrogen effect of grain legumes when preceding a non-legume crop is expected. Therefore, the present work aims at comparing the contribution of three grain legume species to N cycling.

Results

Table 1 – Values of N in plant and in soil across sites.

	Pea	Lupin	Fababean
Grain yield (t.ha ⁻¹)	2,6 (1,4)	1,6 (1,0)	2,7 (1,3)
Grain N - 0% H ₂ O (kg.ha ⁻¹)	91,6 (42,7)	99,2 (63,4)	119,0 (58,5)
Fixed N ₂ (kg.ha ⁻¹) at pea harvest stage	78,2 (44,9)	77,5 (55,8)	97,2 (56,8)
Nitrogen harvest index	0,67	0,81	0,83
Net N contribution (kg .ha ⁻¹) : [(Fixed N ₂ + seed N + root N + rhizodeposition ⁽¹⁾) – total grain N]	+6,6 (21,2)	+1,4 (19,1)	-5,8 (19,1)
Soil inorganic N (kg.ha ⁻¹ N-NO ₃ + N-NH ₄ , 0-60cm)			
- at harvest	58,3 (21,4)	46,1 (28)	50,9 (26,6)
- after drainage period	48,2 (14,2)	42,5 (11,9)	42,5 (12,1)
- at harvest of the following crop	64,7 (20,8)	48,0 (21,9)	54,0 (17)

⇒ A high variability of the performances of the three species was noticed both across sites and on a given plot.

(average values +/- standard deviation)

■ Pea > Lupin and fababean
■ Lupin > Pea and fababean
■ Fababean > Pea and lupin

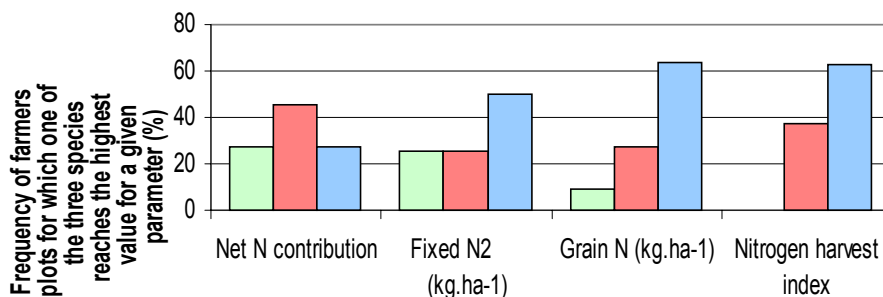


Figure 1 – Comparison of the performances of the three species for each site.