

Legumes increase brassica yields in low-input systems

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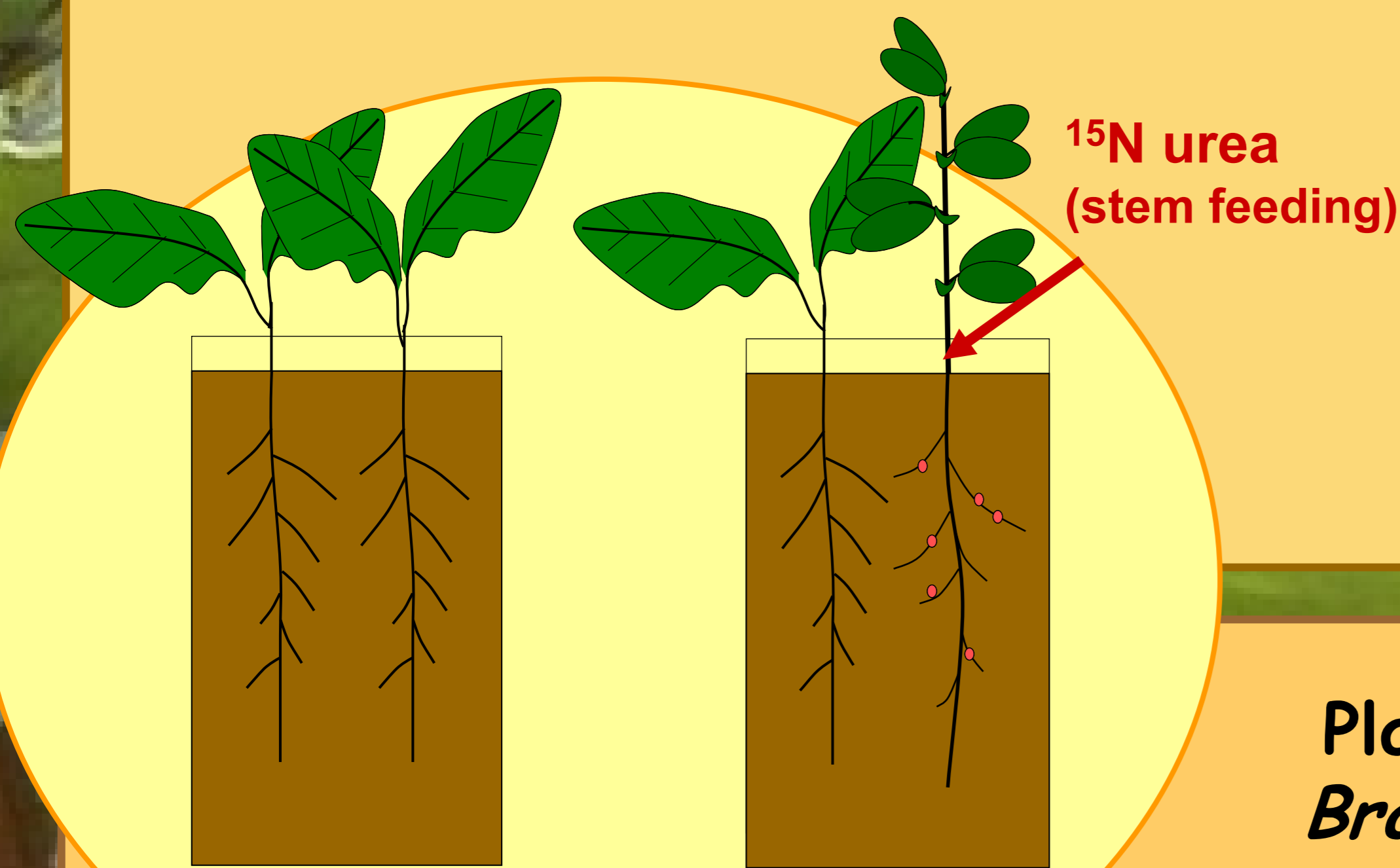
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Background and aims

Cereal/legume intercrops often give Land Equivalent Ratios greater than 1 (Corre-Hellou et al., 2007). Such a result may be due to niche separation and/or nutrient transfers between species (Jensen, 1996; Paynel and Cliquet, 2003). Brassica/legume intercrops are still poorly documented.



Our aims were :

- 1) to compare the development of brassica forages grown either in monoculture, or with a grain legume,
- 2) to quantify nitrogen transfer from legumes to brassicas.

Material and methods

Plants were sown in rhizotrons. Two intercrops were studied: *Brassica napus* grown with *Vicia faba ssp. minor* and *B. oleracea* with *V. sativa*.

They were compared to monospecific rhizotrons sown with *B. napus* or *B. oleracea*. Legumes were ¹⁵N-labelled. Root development was daily recorded. After harvest, above ground parts were prepared for ¹⁵N:¹⁴N measurements.

Results

- ➔ Legume and brassica roots explored different parts of the rhizotrons (Fig. 1)
- ➔ Biological N fixation reached 66 to 82% of the legume N.
- ➔ About 8% of the total N of intercropped *B. oleracea* came from vetch, and about 12% of intercropped *B. napus* total N came from faba bean.
- ➔ Dry weights and N contents of brassicas were higher in intercrops than in monospecific rhizotrons (Tab. 1)

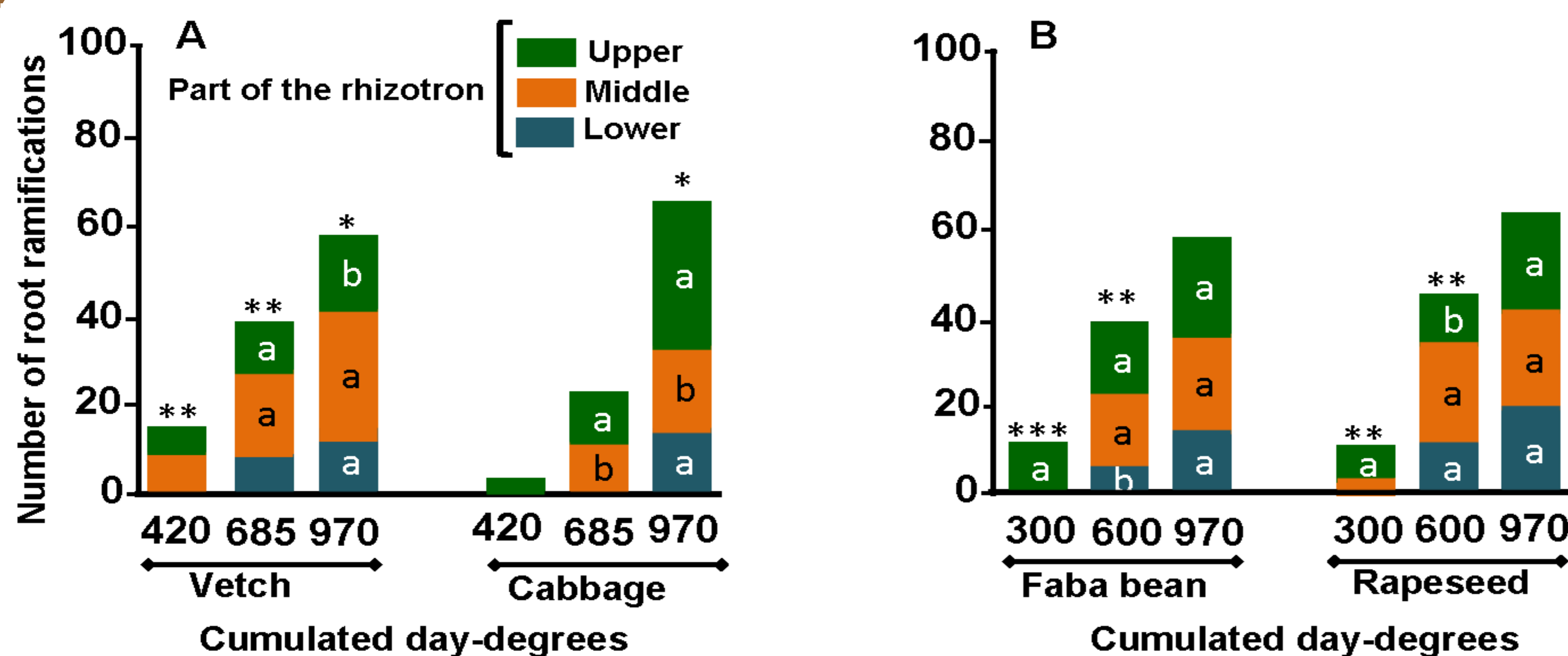


Fig. 1 – Distribution of brassica and legume roots in the upper, middle and lower layers of the rhizotrons. A – Vetch sown with cabbage. B – Faba bean sown with rapeseed.

*, **, *** indicate statistical differences between depth sections at the same date.
(a,b) indicate significant differences between brassicas and legumes for a given depth at a given date.

Tab. 1 – Dry weights and N contents in brassicas grown either with a legume or in monoculture (mean s.e.)

	Dry matter weight (g.plant-1)		N content (mg. plant-1)	
	Cabbage	Rapeseed	Cabbage	Rapeseed
Monoculture	1.8 b	4.3 b	26.9 b	49.9 b
Vetch	2.4 a	-	37.7 a	-
Faba bean	-	6.9 a	-	86.7 a
<i>P</i>	*	**	*	***

*, **, *** indicate statistical differences between depth sections at the same date.
(a,b) indicate significant differences between brassicas and legumes for a given depth at a given date.

Conclusion

Yield and N content of Brassica cultivars were significantly higher when they were grown with a legume than in monospecific rhizotrons. Three weeks of ¹⁵N labelling in the early growth were sufficient to reveal N transfer from grain legumes to brassicas.

References

Corre-Hellou et al. 2007. *Plant Soil* 282: 195-208.
Jensen ES 1996. *Soil Biol. Biochem.* 28: 159-168.
Paynel F, Cliquet JB 2003. *Agronomie* 23: 503-510.