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# Functional evaluation of perennial forage legumes

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## Introduction

We evaluated the functionality of 13 forage legumes in order to identify new species better adapted to resource limited environments in the context of climate change. The objectives were to conduct agronomic characterisation of productivity, feed value and phenology in order to set the value of use of the different species and to characterise their functioning from leaf traits related to growth strategy.

## Materials and methods

Micro plots (2 m<sup>2</sup>) were sown in four replicates. Growth stages were scored visually and expressed as the sum of temperature (°C j). Above ground biomass was measured on several dates for radiation use efficiency (RUE, g MJ<sup>-1</sup>). At blossom, leaf, stem and below ground biomass were measured, as well as organic matter digestibility (OMD), leaf dry matter content (LDMC, mg g<sup>-1</sup>) and specific leaf area (SLA, m<sup>2</sup> kg<sup>-1</sup>). Data treatment was performed with ascending hierarchical classification, based on Ward method, which gives the 'best' possible species clustering into a selected number of classes (Cruz *et al.*, 2010).

## Results and discussion

According to species, RUE varied between 0.8 g and 2.1 g MJ<sup>-1</sup>, OMD between 61 and 85%, blooming onset between 653 and 1,356 °C j, LDMC between 140 and 260 mg g<sup>-1</sup>, and SLA between 19 and 30 m<sup>2</sup> kg<sup>-1</sup>. We identified five groups in which species share common characteristics and display similar value of use. Group 1: *Anthyllis vulneraria* and *Onobrychis sativa* with high RUE, intermediate LSR and OMD, and early bloom are adapted to early use. Group 2: *Lathyrus pratensis*, *Melilotus officinalis*, *M. alba*, *Vicia cracca* and *Bituminaria bituminosa* with low OMD and high lateness are suitable for stocks. Group 3: *Lotus corniculatus* and *Trifolium pretense* with high photosynthetic capacity (high RUE and SLA), high LSR and OMD and high below ground above ground ratio are more tolerant to hydric stress. Group 4: *Medicago sativa*, *Securigera varia* and *Lotus tenuis*, with high RUE and biomass production, low LSR and OMD and very late blooming are suitable for hay stocks. Group 5: *T. repens* with low above and below ground biomass, high LSR and OMD is sensitive to drought and suitable for early grazing.

## Conclusion

This study shows the large functioning diversity present within perennial forage legumes and highlights *V. cracca*, *O. sativa* and *L. pratensis* which tend to grow faster and later than cultivated ones and display favorable feeding value.

## References

- Cruz P., Theau J.P., Lecloux E., Jouany C., and Duru M. (2010) Typologie fonctionnelle de graminées fourragères pérennes: une classification multi traits. *Fournages*, 201, 11-17.