Red clover (*Trifolium pratense*, L.) variety response to cutting

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Introduction:

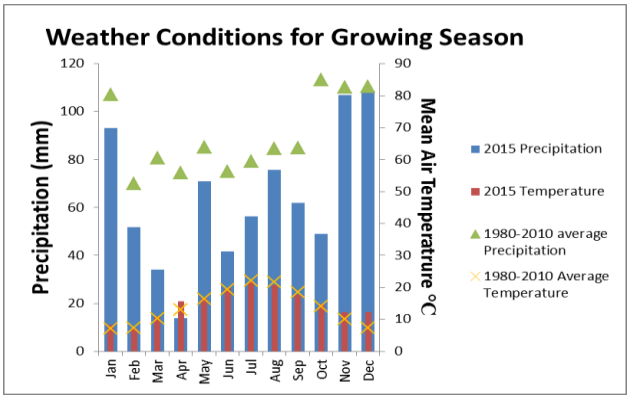
Red clover (Trifolium pratense, L.) leys build soil fertility, produce high-protein forage and provide various ecosystem services (Doel 2013, Moyo et al 2015). They contribute to sustainable intensification in multiple ways. Innovation in variety selection and foliage management may further improve their use. The goal of this project is to evaluate six red clover varieties for soil fertility-building capacity, under the treatments of one and two cuts. The yield and quality of subsequent bioassay crops will be used to assess this capacity.

Materials and Methods:

The self-incompatible nature of wild red clover generates intra-species diversity. This profile predicts significant diversity within different agricultural varieties. Synthetic tetraploid varieties have also been created by breeders. The main classifications of red clover varieties are early/late flowering, diploid/tetraploid and erect/prostrate. Varieties selected for this trial are summarized below.

Variety	Time	Ploidy	Growth Habit	Company or Institution
Amos	Late	Tetraploid	Erect	DLF Trifolium (Denmark)
Astred	Early	Diploid	Prostrate	PGG Wrightson Seeds (Australia)
Claret	Early	Diploid	Erect	IBERS (UK)
Maro	Middle	Tetraploid	Erect	DLF Trifolium (Denmark)
Milvus	Early	Diploid	Erect	Agroscope (Switzerland)
Ruby	Early	Diploid	Erect	IBERS (UK)

The varieties were studied in monoculture on calcareous clay soil in Cirencester, UK. Weather and soil conditions are summarized below. The experimental design was completely randomized block with four replications. Treatments of one and two cuts were applied in July and October, and all cuttings were removed. Temperature was comparable to the long-term average, but less rainfall occurred in the summer months. Performance was documented using DM t ha^{-1} and kg N ha^{-1} in aboveground biomass. Susceptibility to powdery mildew and (*Erysiphe* sp) and clover rot (*Sclerotinia* sp) was also carried out. Results were analysed using Genstat v.15.



pH	Bulk Density (g/cm^3)	Organic Matter (%)	P (mg/L)	K (mg/L)
7.2	1.1	3.6	11.2	234

Results and Discussion:

	First Cut		Second Cut		Total	
	DM (t ha^{-1})	N (kg ha^{-1})	DM (t ha^{-1})	N (kg ha^{-1})	DM (t ha^{-1})	N (kg ha^{-1})
Amos	0.75a	24.37ab	0.82c	30.06d	1.58b	54.43b
Astred	0.56b	15.83c	1.58a	66.99a	2.11a	82.83a
Claret	0.60b	19.25bc	1.64a	63.29ab	2.20a	82.99a
Maro	0.85a	28.20a	1.51ab	57.19bc	2.39a	83.62a
Milvus	0.49b	19.28bc	1.60a	61.5abc	2.17a	80.73a
Ruby	0.56b	19.15bc	1.35b	54.78c	1.95ab	73.93ab
SED	**0.06**	**3.32**	**0.11**	**4.79**	**0.15**	**6.3**

Results are subjected to ANOVA and SED ($p<0.05$) to determine significance

Yield: The later flowering tetraploids yielded significantly higher DM t ha^{-1} and N kg ha^{-1} in the first cut, but only the mid-flowering variety (Maro) maintained good growth until the second cut. Aboveground N yields were comparable to other research.

Disease Susceptibility: Infections of powdery mildew and clover rot were scored according to Dixon and Doodson (1971) and Singh et al (2013) respectively. The variety Ruby was shown to be less susceptible to both diseases.

Conclusion

Significant differences in biomass accumulation were observed in different red clover varieties. Red clover leys can accumulate up to 85kg N ha-1 in the first year. Although predicted by breeders, tetraploidy was not shown to increase resistance to powdery mildew and clover rot.

References: Dixon, G. R. and Doodson, J. K. (1971) Assessment keys for some diseases of greens, fodder and herbage crops. *Journal of the National Institute of Agricultural Botany*. 12: 299-307

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