

Introduction

Intercropping is gaining increasing interest in UK in the context of organic farming, because of the potentially more efficient utilization of resources and possibly of reducing weeds, plant pathogens and nitrogen losses (Wiley, 1979). However, competition between the undersown crop and main crop for potential resources can greatly reduce primary crop growth and yield (Clements & Williams, 1967).

Aim

To compare the influence of different undrown legumes and to possibly identify suitable legumes for undersowing

Experimental design & undersowing treatments

The study was conducted from Mar 2012 to Aug 2012 at the Royal Agricultural University's Harnhill Manor farm (NGR SP 075 006) near Cirencester, UK. The experiment was a one factor randomized block design with 4 replicates using spring wheat. On 11 Apr 2012 a block of 24 x 3m was set up and split into 8 and undersown with 7 different legumes and non-undersown treatments. The legumes undersown included white clover WC (*Trifolium repens*), black medic BM (*Medicago lupulina*), bird's foot trefoil BT (*Lotus corniculatus*), vetch V (*Vicia sativa*), red clover RC (*Trifolium pratense*), crimson clover CC (*Trifolium incarnatum*) and persian clover PC (*Trifolium respinatum*); the plots were hand harvested on 22 August 2012.

Results

Effect of undersown legumes on organic spring wheat

	Plant heights (cm)	Ear (number m ⁻²)	Wheat DM (t ha ⁻¹)	Grain yield (t ha ⁻¹)	Legume DM (t ha ⁻¹)	Non-wheat DM (t ha ⁻¹)
Non-undersown	81.52a	372a	9.37a	3.79a	0.130a	0.307a
Wheat + WC	81.16a	360ab	8.89ab	3.61ab	0.258b	0.452ab
Wheat + BM	80.66ab	335ab	8.52ab	3.51ab	0.264b	0.489abc
Wheat + BT	80.44ab	328ab	7.34bc	2.92bc	0.272b	0.517bc
Wheat + V	79.25b	307bc	7.28bc	2.84bc	0.293bc	0.571bc
Wheat + RC	77.17c	290bc	6.75c	2.62c	0.298bc	0.563bc
Wheat + CC	76.30cd	286bc	6.60c	2.52c	0.358bc	0.667c
Wheat + PC	75.14d	275c	6.26c	2.27c	0.393c	0.675c
SED	0.86	24.81	0.862	0.41	0.058	0.104
<i>P</i>	***	**	**	**	**	*

Any two mean within columns not sharing common letters differs significantly. *** significance $p < 0.001$, ** significance $P < 0.01$, * significance $p < 0.05$, ^{ns} non-significant



Discussion & Conclusion

- Wheat grain yield forming factors were related positively to plant heights, ear numbers and wheat DM, and negatively to legume DM and non-wheat DM.
- Quick growing and higher DM yield of legumes directly caused a significant negative effect on the main crop, supporting the view of Clements & Williams (1967).
- The increase in legumes DM yield also indirectly caused an increase in non-wheat DM yields with PC, CC, RC, V and BT was significantly higher compared to non-undersown. The direct and indirect effects of legumes contributed to greater competition in a growing environment, affecting yield forming factors and yield compared to non-undersown. Thus the success of cereal-legume bi-cropping not only depends on the undersown legumes but also on the infestation of weed population (Liebman & Dyck, 1993).

Among legume species tested, prostrate growing WC and BM proved to be more suitable than other legumes.

References

- Clements C R, Williams T.E. 1967. Leys and organic matter. II. The accumulation of nitrogen in soils under different leys. *Journal of Agricultural science*, Cambridge 69, 133-138
- Liebman M, Dyck E. 1993. Crop rotation and intercropping strategies for weed management. *Journal of Applied Ecology* 3, 92-122
- Wiley. R W. 1979. Intercropping – Its importance and research needs. Part 2. Agronomy and research approaches. *Field crop Abstracts* 32, 73-85.