Contribution of Lucerne and Red Clover to Succeeding Cereal Crops Yield

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Introduction Nowadays , under the conditions of sustainable or organic farming it becomes very important to use legumes . Introduction of ley/arable rotations could be an effective tool for a significant further reduction of the use of external N-input and an increase of the N use efficiency (Nevens et al . , 2004) . Species of legumes , management of the preceding sward thus greatly influences the yield of the succeeding crop (Høgh-Jensen and Schjoering , 1996 ; Kadžiulis , 2001) . The aim of the studies was to assess the contribution of two year age red clover and lucerne swards on spring wheat yield .

Materials and methods During 2003—2006 a randomized block design field trials were carried out on a loamy *Endocalcari-Epihypogleyic Cambisol* near Dotnuva , Lithuania (55°24′N , 23°50′E) . Soil pH varied from 6.5 to 7.0 , humus content was 2.5% -4.0% , available P 50-80 mg and K 100-150 mg kg^{-1} . Legume/grass mixtures were sown with and without a cover crop of barley (*Hordeum vulgare* L .) or peas (*Pisum sativa* L .) for whole crop or of barley for grain . Red clover (*Trifolium pratense* L .) and lucerne (*Medicago sativa* L .) were sown in mixtures with perennial ryegrass (*Lolium perenne* L .) . Barley and peas as whole crops were harvested at the wax and grain greasy stage , respectively , and for one treatment-barley for grain- at complete ripeness stage . The yields of swards were taken-off at flowering stage of the legumes . The swards were cut twice in the first year and three times in second year . The legume/grass swards in autumn of 2nd year were ploughed-in and succeding crop spring wheat (*Triticum aestivum* L .) for grain was sown in spring . Wheat was harvested at complete ripeness stage . During years of experiments climatic conditions differed : 2003 was dry , 2004 and 2005 were normal , and 2006 very dry and warm .

Results and discussion Lucerne/ryegrass swards were more sensitive to the competitive cover crop than red clover/ryegrass swards , yield formation rate was significantly higher of the swards that grew without a competitive plant , except for drier years (Table 1) . Yield formation rate and size of the red clover /ryegrass swards sown without a cover crop were to counterbalance the benefit provided by a cover crop , although in wetter years the total yield practically did not differ when grown with and without a cover crop . The effect of red clover/rygrass and lucerne/ryegrass swards on the yield of succeeding crop spring wheat and on nitrogen accumulation in grain significantly differed in wetter year due to the sward composition and did not differ due to different combinations of cover crop . In drier years the effect of sward composition on cereal yield was weak .

Table 1 *The yield of different legume/grass swards and their impact on succeeding spring wheat grain yield .*

Swards+cover crop	Yields from Experiment 1 , kg ha^{-1}				Yields from Experiment 2 , kg ha^{-1}			
	[a] 2003	[a] 2004	[b] 2005	[c] 2005	[a] 2004	[a] 2005	[b] 2006	[c] 2006
R . clover , p . ryegrass	2867	7897	2977	57 .5	6761	10334	2274	44 .4
R . clover , p . ryegrass+Bgr	5461	7486	3092	59 .7	5237	9530	2342	59 .5
R . clover , p .ryegrass+Bwc	6000	7722	3198	61 .7	6387	10887	2121	52 .8
R . clover , p .ryegrass+Pwc	4790	7498	3273	63 .2	6735	10388	2128	54 .3
Lucerne , p . ryegrass	4045	12056	3853	77 .4	6883	9803	2183	57 .4
Lucerne , p . ryegrass+Bwc	4715	10193	3780	76 .0	3993	7848	1866	48 .3
Lucerne , p . ryegrass+Pwc	5329	11805	3810	76 .2	4938	8810	2022	52 .0
Perennial ryegrass	2025	3607	2092	40 .2	5826	4207	1776	41 .7
LSD_{05}	857 .7	766 .0	211 .9	4 .12	605 .9	771 .0	185 .4	4 .46

Bgr barley for grain , Bwc-barley for whole crop , Pwc-peas for whole crop , [a] DM of swards , [b] grain yield , [c] N in grain

Conclusions The two years' total yield of swards and its formation rate differed due to legume species , different competitive plant and climatic conditions . The effect of legume species on the yield of succeeding spring wheat and nitrogen in grain yield dependet more on the climatic conditions than on other factors .

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