Alternative nitrogen sources for grassland nutrition

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Alternative N sources for grassland nutrition

- Legumes (red clover, white clover, alfalfa, galega etc.
- Organic manures (cattle and pig slurry)

The method for the N replaced by legume accounting (accounting on the basis of DM yield)

- Grasses yield in unfertilized treatment or control treatment or N0
- Grasses yield on fertilizer backgrounds (N100; N200; N300)
- Grasses - legume mixture yield

Yield obtained due to fertilizer N =

Grasses yield on N fertilizer backgrounds (N100; N200; N300) – Grasses yield in control treatment

Yield obtained due to legume N =

Grasses + legume yield – Grasses yield in control treatment

Example

Yield obtained due to legume N - 4,3 t ha^{-1}

Yield obtained due to fertilizer N - N100= 4,0 ; N200= 7,2 ; N300= 9,0 t ha^{-1}

Replaced mineral nitrogen amount, kg ha^{-1} = 100 X 4,3/4,0 =107,5 kg N

Mineral nitrogen amounts replaced by legumes (*Sau, 1983; Laidna et al., 1994*)

Legume	Year	Content in the yield, %	DM yield, t ha^{-1} (Grass + legume)	Replaced mineral nitrogen amount, kg ha^{-1} y^{-1}
Red clover *Trifolium pratense*	1…2	87	10,4	320
	3…4*	2	7,7	17
	5**	64	5,8	123
Alsike clover *Trifolium hybridum*	1…2	81	9,0	170
	3…4*	4	7,0	6
	5**	59	4,9	94
White clover *Trifolium repens*	1-5	30…40	5,5	135
Alfalfa *Medicago sativa*	1…2	84	8,5	194
	3…4	66	7,4	132
	5	68	7,6	189
Galega *Galega orientalis*	1…5 6…10	56 80	7,4 14,0	107 363

*Fertilized with mineral N. Applied N rates 100 kg ha-1 and 150 kg ha-1 on 3 and 4 year respectively. **Reseeded

Table 2. Chemical composition of cattle slurry

Factor	Sampling time			
	16.04.08	28.04.09	8.05.09	30.07.09
pH	Nd*	6,56	6,7	6,6
DM, %	8,3	8,54	7,84	8,05
total N, kg t^{-1}	3,65	3,83	3,78	3,95
NH_4-N, kg t^{-1},	1,6	1,51	2,02	2,3
NO_3-N, kg t^{-1}	0	0	0,001	0,002
NH_4-N % from total N,%	43,9	39,5	53,4	58,2
total P, kg t^{-1}	0,73	0,81	0,82	0,79
total K, kg t^{-1}	2,28	2,87	2,72	2,7
N:P:K ratio	1:0,20:0,62	1:0,21:0,75	1:0,22:0,72	1:0,20:0,68

nd* not determined

Optimal N:P:K ratio for grasses fertilization 1:0,22:0,62

Table 2. Chemical composition of sewage sludge

Factor	Content
pH	nd
DM, %	19,9
total N, kg t^{-1}	6,78
total P, kg t^{-1}	1,06
total K, kg t^{-1}	0,58
N:P:K ratio	1 : 0,16 : 0,08

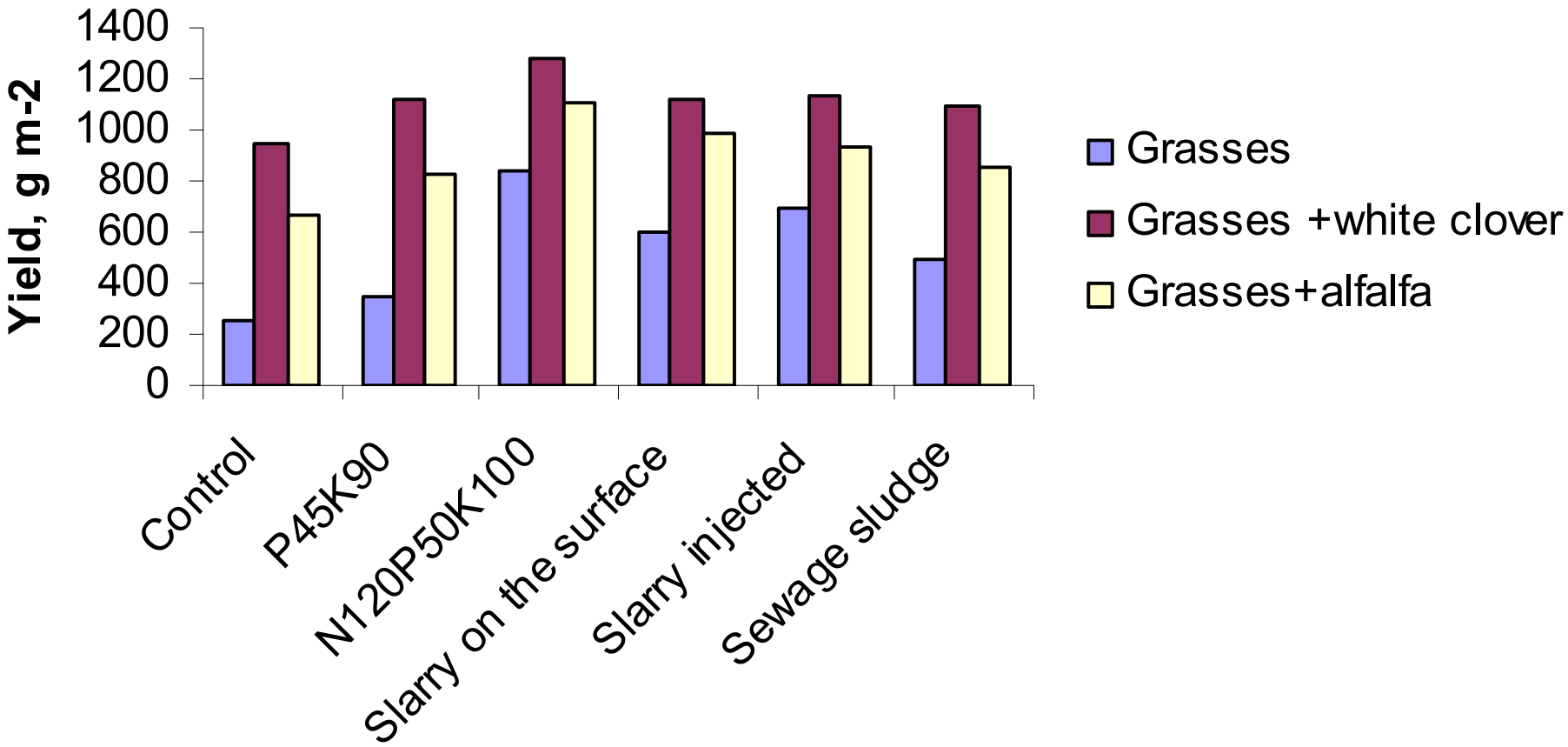

Figure 1.Swards yields on mineral fertilizers and organic manures background

Conclusion

- Legumes ability to replace mineral nitrogen is high but problem is legumes short time persistence in grassland sward.
- Organic manures application effect depended on sward type and it was highest in case of grasses sward.
- It seems the highest energetic effect in grassland could give grass + legume swards utilization in case to fertilize it with organic manure.

Thank you for your attention

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