The influence of winter wheat and white clover bi-cropping system on white clover sward parameters

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Introduction Whole-crop silage produced in a bi-cropping system represents a low-input forage production system (Clements *et al*., 1997). Depressing competition of white clover (by mowing or spraying with herbicides) when winter wheat starts its growth is necessary in this system. Winter wheat also competes with white clover during crop growth. The number of growing points as well as the length and weight of stolon are the main parameters that characterise the persistence of white clover (Jorgensen & Ledgard, 1997; Marriott & Haystead 1990). The purpose of the present investigation was to study the effects of a bi-cropping system on some parameters of white clover.

Methods Field experiments were conducted in 1998-2001. A sward of white clover (cv Grassland Huia) was established in April 1998. Winter wheat (cv Kobra) was directly drilled into white clover in autumn 1998, 1999 and 2000. Before winter wheat was sown, the white clover sward was sprayed with a low rate of glyphosate (2 l/ ha). The data were compared with those obtained with a pure white clover sward without herbicide (control). There were four replicates of each treatment. The sward samples were taken from 0.02 m^2 areas six times during the entire experiment. Directly after sampling, soil was separated and white clover stolons were washed. The number of growing points, length and weight of stolons were measured. . The results were analysed statistically by analysis of variance (STATISTICA software).

Results Spraying with glyphosate and winter wheat competition in the bi-cropping system decreased the growth of white clover. The number of growing points was lower for almost every measurement. On average, the number of growing points of the control was 37% higher than that in the bi-cropping system and the lengths of stolon in the control were 133% higher. The weight of stolon in the bi-cropping system was higher than that in the control only in autumn 2000, when the value for bi-cropping was 62% higher. On other dates, the stolon mass was higher in the control. On average, the weight of stolon in the control was 62% higher than that in the bi-cropping system.

Table 1 The effects of sowing method on some parameters of white clover

Measurement date	Growing points (x 1000/m^2)		Length of stolon (m/m^2)		Weight of stolon (g/m^2)	
	Bi-cropping	Control	Bi-cropping	Control	Bi-cropping	Control
23-10-98	2.5	4.6	36	169	15	150
23-04-99	5.9	7.8	75	187	57	134
30-11-99	4.2	8.1	78	220	99	351
18-04-00	9.7	8.2	99	166	111	167
22-11-00	4.8	7.4	113	207	344	210
25-04-01	5.6	8.5	79	171	111	193
Significance	*	***	*	n.s.	***	**
Average	5.4	7.4	80	186	123	200
Significance	**		***		*	

Conclusions The combination of herbicide treatment and sowing winter wheat significantly decreased the growth of white clover and influenced the persistence of white clover. After two years of bi-cropping, white clover parameters decreased. In the south-west of Poland, the bi-cropping system can be recommended for a maximum of three years in the same field.

References

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