

Effect of the preceding crop and the crop rotation on seed yield of oilseed rape in NW Germany

Introduction

Information about the effect of the preceding crop (combination) or crop rotation on seed yield of oilseed rape (OSR) is extremely scarce. In the most rotation trials, OSR is used as a favourable preceding crop for (winter) wheat, but seldom as test crop.

Materials and Methods

In 1988-2001, a long-term rotation experiment with 15 rotations (two without OSR) was carried out on a pseudogleyic sandy loam (Luvisol) at the Hohenschulen Experimental Farm in NW Germany (15 km west of Kiel). The rotations included winter wheat, winter barley, winter OSR, peas and oats, and ranged from continuous cropping to five course rotations. According to the principles of crop rotation experiments, each single component of these 15 rotations was present every season. Within the year, the sowing date of OSR was the same in all plots.

Table 2: Seed yield ($t\ ha^{-1}$) of oilseed rape (OSR) in different crop rotations (1988-2001)

No.	Crop rotation [†]				% OSR
1	3.33 st	(monoculture)			100
2	3.58 ^{bcd}	Wheat			50
3	3.67 ^{bcd}	Barley			50
4	3.50 ^{cde}	3.39 ^{de}	Wheat		66
5	3.82 ^{abc}	Wheat	Barley		33
6	3.65 ^{bcd}	Wheat	Wheat		33
7	4.05 ^a	Wheat	Peas		33
8	3.68 ^{bcd}	3.55 ^{cde}	Wheat	Wheat	50
9	3.81 ^{abc}	3.58 ^{bcd}	Wheat	Peas	50
10	3.83 ^{abc}	Wheat	Peas	Wheat	25
11	3.85 ^{abc}	Wheat	Oats	Barley	25
12	3.91 ^{ab}	Wheat	Peas	Wheat	20
13	3.60 ^{bcd}	Wheat	Peas	3.79 ^{abc} Wheat	40

‡ - The figures show the seed yield of oilseed rape within the crop rotation.

† - Means with the same letter within a column do not differ significantly at $p=0.05$.



Fig. 1: Aerial view of the rotation trial at Hohenschulen Experimental Farm

Table 1: Effect of the preceding and pre-preceding crop on seed yield ($t\ ha^{-1}$) of oilseed rape (1988-2001)

Pre-preceding crop	Preceding crop	Yield ($t\ ha^{-1}$)	
		Year 1	Year 2
Wheat	Peas	3.90 ^{at}	3.90 ^a
Wheat	Barley	3.86 ^a	
Oats	Barley	3.85 ^a	3.80 ^a
Oilseed rape	Barley	3.67 ^{ab}	
Peas	Wheat	3.84 ^a	
Wheat	Wheat	3.66 ^{ab}	3.64 ^b
Oilseed rape	Wheat	3.56 ^b	
Peas	Oilseed rape	3.58 ^b	
Wheat	Oilseed rape	3.47 ^{bc}	3.46 ^c
Oilseed rape	Oilseed rape	3.33 ^c	

‡ Means with the same letter within a column do not differ significantly at $p=0.05$.

Results and Conclusion

OSR seed yield varied considerably between the 14 years, ranging from $2.73\ t\ ha^{-1}$ in 1991 up to $5.27\ t\ ha^{-1}$ in 2001. OSR grown after peas and barley yielded most with $3.90\ t\ ha^{-1}$ and $3.80\ t\ ha^{-1}$ (Table 1). Seed yield decreased significantly, if the preceding crop was wheat ($3.64\ t\ ha^{-1}$). Lowest seed yield with $3.46\ t\ ha^{-1}$ was observed after OSR. In addition, not only the directly preceding crop, but also the crop grown two years ago affected seed yield. A higher percentage of OSR (40 % and more) in crop rotations decreased seed yield (Table 2).

OSR responds like wheat clearly to an unfavourable preceding crop and crop rotation of ca. 10 % of the grain yield. In general, the seed yield of OSR increased with the length of the break between two OSR crops, even if all the plots were planted on the same date.