

Investigations about sowing of oilseed rape with combine-seeder technique

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Abstract

Oilseed rape can be sown in one operation with the combine-seeder during the harvest of wheat. Advantages are: substantial lowering of the costs of labour and the working time needed, sowing into stubbles, therefore no problems with straw, sparing of the supplies of soil water, very good erosion protection, and lowering of herbicide costs is possible. The combine-seeder technique is only effective for special cutter bar widths and combine types. After sowing the shredded straw falls on the soil surface and the plants has to grow through the straw layer. This can result in a long hypocotyl with negative effects on hibernation. This problem can be reduced by a suitable straw management (good cutting up, distribution and rolling of the straw), by cultivation of robust and winter-hard varieties, the application of azol-fungicides in autumn, and seed dressing with SAT 2002 (active substance metconazol).

The advantages of the combine-seeder technique can only be achieved if similar high and safe yields are obtained compared with conventional tillage. The combine-seeder was successfully tested in altogether eight experiments from 2003 – 2005 at different farms in Mecklenburg-Vorpommern, Germany. The tests were carried out with the varieties 'Talent', 'Baldur', 'Smart' and the semi dwarf hybrid 'PR45D01'. Hybrids were sown at a seed rate of 60 seeds per m² and conventional varieties (Smart) at 70 seeds per m².

Compared with yields of standard minimum tillage (twice cultivator, seeder) the combine-seeder had slightly lower yields (3-5 per cent). Further research needed to be done for the optimization of nitrogen fertilization in autumn and the effective control of weeds and field mice.

Key words: Oilseed rape, combine seeder, minimum tillage, straw management, seed dressing

Introduction

Conservation tillage systems have a number of ecological and economic advantages. Combine-seeder technique is an accurate direct seed procedure and requires less time and energy compared with conventional tillage. The soil is not prone to erosion. Combine-seeder technique was tested primary for intercropping systems (Zeddis, 2000). The experiments have been shown that the combine seeder is also suitable for oilseed rape.

Material and Methods

Field experiments were conducted at four different sites in the north east of Germany in the state Mecklenburg-Vorpommern. This region is characterized by a maritime climate, medium loamy soils and has the largest density of oilseed rape production in Germany. The mean annual precipitations depending on the site averages are between 542 (Gülzow, Boldebeck) and 653 mm (Bandow, Huckstorf) and the mean annual temperature is 8,3 °C. Winter wheat was the most frequently preceding crop for oilseed rape in the last years. With the combine-seeder oilseed rape was sown in one operation with the harvest of the wheat. The combine 'Dominator 118' of the company Claas were used for the experiments. The tested prototype of combine seeder were developed from the company Güttler. The seeder including the seed container is behind the cutting platform of the combine. The seed-groove results from a diagonally placed disk crowd. The combine seeder can be installed and diminished without any tools. The achievement of the combine is not impaired.

The devices tested so far are bound at certain cutting platform widths and combine types. The tests were carried out with the varieties 'Talent', 'Baldur', 'Smart' and the semi dwarf hybrid 'PR45D01'. Hybrids were sown at a seed rate of 60 seeds per m² and conventional varieties (Smart) at 70 seeds per m² (Table 1).

The effect of seed coating with metconazol on the hypocotyl and the yield was studied with two cultivars. The combine seeder experimental plots were sown earlier than the plots with standard minimum tillage because sowing date with the combine seeder depends on optimal harvest date of winter wheat (Table 2). Slug pellets were applied overall after sowing. Different fungicide and nitrogen intensities were laid out across the sowing plots.

Results and Discussion

With the combine seeder technique it is possible to establish oilseed rape in a good quality. Compared to standard minimum tillage with following seeder or other direct drilling systems occur less problems with straw during sowing. After sowing the shredded straw falls on the soil surface and the plants has to grow through the straw layer. This can result in a long hypocotyl with negative effects on hibernation. This problem can be reduced by a suitable straw management (good cutting up, distribution and rolling of the straw), by cultivation of robust and winter-hard varieties, the application of azol-fungicides in

autumn, and seed dressing with SAT 2002 (active substance metconazol).

The results from four experimental sites in two years clearly demonstrate, that oilseed rape can produce respectable seed yields with combine-seeder technique compared with standard minimum tillage (twice cultivator, seeder). The slightly lower yields must be seen under the aspect of cost reduction (Table 3).

No tillage leads to substantial lowering of the costs of labour and the working time needed. Combine seeder technique enables cost reduction from 70 to 100 €/ha. In some cases it is only necessary to control volunteer wheat. Than lowering of herbicide costs is possible.

Further research needed to be done for adaption of the seeder to different combine-types, for the optimization of nitrogen fertilization in autumn and the effective control of weeds and field mice.

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Table 1: Survey of experiment variants

Treatment	Sowing system	Variety 2004/2005	Seed rate seeds/m ²	Seed dressing 2004/2005	Straw removal
T1	minimum tillage, seeder	Talent/Baldur	60	Standard + Dimethomorph (DMM)	no
T2	combine seeder	Talent/Baldur	60	Standard + Dimethomorph (DMM)	no
T3	combine seeder	Talent/Baldur	60	Standard + Dimethomorph (DMM)+ Metconazol (SAT 2002)	no
T4	combine seeder	Smart/Smart	70	Standard* + Dimethomorph (DMM)	no
T5	combine seeder	Smart/Smart	70	Standard* + Dimethomorph (DMM)	yes
T6	combine seeder	Smart/Smart	70	Standard* + Dimethomorph (DMM)+ Metconazol (SAT 2002)	no
T7	combine seeder	-/PR 45 D01	60	Standard	no

* 2005 standard seed dressing: Cruiser OSR without DMM

Table 2: Sowing dates depending on sowing system

Sowing system	Sowing date	
	2003	2004
standard minimum tillage	21.08.- 25.08.	25.08.- 02.09.
combine seeder	05.08.- 07.08.	16.08.- 20.08.

Table 3: Effects of sowing systems on plant development and yield results

Treatment	Plant density (Plants/m ²)		Hypocotyl (mm)	Root neck diameter (mm)	Yield mean, n = 8	
	autumn 2004	spring 2005	autumn 2004		t/ha	%
T1	41	36	10,8	7,4	4,92	100
T2	44	36	24,8	7,8	4,36	89
T3	42	31	6,9	8,9	4,63	94
T4	44	31	21,8	7,5	4,49	91
T5	38	28	13,9	7,4	4,67	95
T6	49	31	8,1	8,4	4,78	97
T7	43	39	17,1	7,5	4,79	97
LSD 5 %					0,28	6