

METHODS OF HARVESTING SPRING OILSEED RAPE

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Introduction

In Denmark spring oilseed rape is generally threshed after swathing and drying on the stubble. However, some farmers prefer to combine the crop directly on the root, usually because of an early mature crop. Because of this and the fact that it is claimed that the new rapeseed types with a small content of erucic acid or double low are less inclined to seed fall, the quality of rapeseed harvested by the two methods and the possibilities of yield differences were examined.

Materials and methods

The experimental series comprised totally eight trials from 1976 to 1979 located at two research stations. The variety of spring oilseed rape used was Olga which has a small erucic acid content. The soil type was clay; 40 kg P and 100 kg K were applied per hectare as well as 125 kg N or 175 kg N per ha. Sowing took place from mid-April to May 7th, depending on the year.

In the experiment 10 treatments with two replications at 125 N and two replications at 175 N were included.

The experimental plan was as follows:

1. Swathing about one week earlier than normal time
2. - at normal time
3. - one week later than normal time
4. Direct combining at normal time of swathing
5. - - one week later than 4
6. - - two weeks later than 4
7. - - three weeks later than 4
8. - - four weeks later than 4
9. Withering with Reglone (2.5 litres/ha) at normal time of swathing
10. Withering with Reglone one week earlier than 9

"Normal" time of swathing means the time when the rapeseed field has a yellowish look and one third of the seeds in the siliques are brown. Seed yield, content of oil, crude protein and chlorophyll, seed weight, dry matter content of seeds and stalks at threshing and residues of Reglone (diquate) in seeds from various treatments were determined.

Results and discussion

Because the yields of oil and crude protein were almost equal of the treatments only the oil yield will be commented upon (table 2).

When the oilseed rape was swathed at normal time the oil yield was higher than at earlier or later swathing. Direct combining one week later than the normal time of swathing (5) brought about the same oil yield as when swathing at normal time. Earlier or later direct combining resulted in smaller yields irrespective of the nitrogen level as can be seen for the treatments 4, 6, 7 and 8.

Withering the rapeseed crop with Reglone was more advantageous at the low nitrogen level; spraying at the normal time of swathing was better than treatment one week earlier.

In table 4 the dry matter content of seeds and stalks is shown at the times when the crop was swathed or directly combined. Loss before and during threshing has been stated in hkg per ha. The dry matter content of the seeds was rather low. Even at the latest threshing (treatment 8) only 86 per cent dry matter in the seeds has been obtained. The largest dry matter content of the stalks was found in the treatments 1 and 2.

The investigation of loss was carried out by placing trays in the plots. On the whole a smaller loss was found at the high nitrogen level. This is probably due to the fact that the plants were not as developed and therefore they were less inclined to seed fall.

Late swathing (3) and late direct combining (7 and 8) resulted in an unacceptable seed loss before threshing. The seed loss during the threshing was almost equal for all treatments. From year to year and from location to location there was a considerable variation in seed loss. The largest loss was found in treatment 7 and 8 with 10-11 hkg seed per ha and in treatment 10 with 10-12 hkg seed per ha.

The seed weight was only slightly affected by the treatments (table 5). The seed weight tended to be lower in the case of early crop treatment (treatment 1 and 10). The content of chlorophyll in the seeds was unacceptably high at early direct combining, early swathing and early treatment with Reglone. If the content is of 30-40 ppm or more the oil will be discoloured.

Reglone (diquate) residues in the seeds were studied. The largest amount was found in the early treatment but did not exceed the limit of the accepted content which is of 2.0 mg per kg seed.

When comparing the seed yields obtained (table 1) with the loss (table 4) the total yield seems to be almost equal for the three methods.

However the yield in the case of direct combining tended to decrease at the latest threshings.

The accumulation of oil in the seeds seems to have finished before the start of the treatments, i.e. when the moisture content in the seeds is about 35 per cent. Other authors have come to the same conclusion (I.E. Ohlsson 1974, N.P. Madsen 1980, Teuteberg 1978 and Gesslin 1965).

The chlorophyll content can be undesirably high when combining directly, swathing or withering too early. Frost, too quickly drying or drought can also fix the chlorophyll content (eg. as demonstrated by Lööf 1966, Lööf & Johansson 1969, Lööf 1970 and Mattson 1972). However the high chlorophyll content in seeds when harvested can be decreased considerably by means of slow drying.

Instructions for farmers

In an upright mature rapeseed crop there will always be a risk of seed fall in the case of high winds. The crop ought to be swathed when the field has a yellowish look and about one third of the seeds in the siliques are brownish. It could be an advantage to combine directly about one week after the normal time of swathing if the crop is homogeneously mature with only little lodging. Withering with Reglone can be used when the crop is very leafy, when it is not homogeneously mature or if it has a large number of green weeds.

Literature

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Table 1. Seed yield at two N-levels and yield increase for 50 N applied.

Treatment	No extra N Seed yield		+ 50 N Seed yield		Yield increase for 50 N applied
	hkg/ha m.c. 9 %	propor- tionals	hkg/ha m.c. 9 %	propor- tionals	hkg/ha m.c. 9 %
1	23,8	96	25,3	96	1,5
2	<u>24,8</u>	<u>100</u>	<u>26,3</u>	<u>100</u>	1,5
3	23,0	93	24,8	94	1,8
4	22,3	90	23,1	88	0,8
5	24,9	100	26,4	100	1,5
6	23,4	94	25,4	97	2,0
7	21,6	87	23,2	88	1,6
8	19,6	79	21,0	80	1,4
9	25,4	102	25,6	97	0,2
10	24,7	100	24,5	93	-0,2

Table 2. Yield and content of oil at two N-levels

Treatment	No extra N			+ 50 N		
	kg/ha	propor- tionals	% oil	kg/ha	propor- tionals	% oil
1	905	96	41,8	951	96	41,3
2	<u>946</u>	<u>100</u>	42,0	<u>993</u>	<u>100</u>	41,5
3	874	92	41,9	930	94	41,3
4	856	90	42,2	877	88	41,8
5	947	100	41,9	992	100	41,3
6	898	95	41,9	955	96	41,4
7	824	87	41,8	875	88	41,4
8	750	79	41,8	787	79	41,2
9	973	103	42,1	959	97	41,4
10	952	101	42,4	928	93	41,6

Table 3. Yield and content of protein at two N-levels

Treatment	No extra N			+ 50 N		
	kg/ha	propor- tionals	%	kg/ha	propor- tionals	%
1	522	94	24,3	572	96	24,9
2	<u>553</u>	<u>100</u>	24,6	<u>596</u>	<u>100</u>	25,0
3	514	93	24,6	565	95	25,4
4	490	89	24,3	525	88	24,9
5	552	100	24,4	606	102	25,3
6	524	95	24,6	585	98	25,4
7	483	87	24,8	536	90	25,6
8	440	80	24,9	489	82	25,8
9	563	102	24,5	589	99	25,4
10	540	98	24,2	558	94	25,1

Table 4. Dry matter content in case of swathing and direct combine harvesting and waste before and during threshing.

Treatment	% dry matter at threshing		Waste before threshing		Waste during threshing		hkg/ha	
			hkg/ha		hkg/ha		hkg/ha	
			no extra N	+ 50 N	no extra N	+ 50 N	no extra N	+ 50 N
1	74,8	72,9	0,6	0,7	0,6	0,7	1,2	1,4
2	78,0	70,6	1,9	1,4	1,5	1,2	3,4	2,6
3	81,2	59,8	3,8	2,2	2,0	1,3	5,8	3,5
4	65,0	27,7	0	0	1,2	0,8	1,2	0,8
5	77,5	37,4	0,6	0,3	1,2	1,1	1,8	1,4
6	80,7	44,3	1,9	0,9	2,0	2,0	3,9	2,9
7	83,4	44,2	4,2	2,0	1,8	1,4	6,0	3,4
8	86,0	61,7	4,7	3,0	1,9	1,3	6,6	4,3
9	81,0	56,3	0,5	0,3	2,3	1,5	2,8	2,1
10	73,5	49,6	0,1	0,1	4,0	2,1	4,1	2,2

Table 5. Seed weight, chlorophyll content and residue of Reglone in seed.

Treatment	Seed weight, mg		Chlorophyll content		Residue of Reglone mg/kg
			pmm (4 trials)		
	no extra N	+ 50 N	no extra N	+ 50 N	
1	3,2	3,2	74	76	
2	3,3	3,3	32	35	
3	3,4	3,4	26	28	
4	3,3	3,2	222	223	
5	3,4	3,3	42	46	
6	3,4	3,3	21	24	
7	3,5	3,4	19	20	
8	3,4	3,4	16	14	
9	3,3	3,3	43	45	0,56
10	3,2	3,1	137	153	0,94