

## UNDERSOWING OF WINTER RAPESEED IN CEREALS

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### ABSTRACT

Undersowing of winter rapeseed in a spring barley crop would be a method to avoid problems with sowing of rapeseed in time in the Autumn due to late harvest of the previous crop, a dry soil or too much work. Three experiments during 1989-92 have shown, that rapeseed sown two weeks after the germination of the barley do not reduce the yield of barley, but the germination of rapeseed can be restrained due to lack of moisture. In spite of a low plant density the rapeseed crop took up nearly all mineralized nitrogen during the Autumn. The wintering of the crop was satisfactory, and the yield of seed was nearly as high as in a crop sown in the middle of August.

### INTRODUCTION

In Denmark it is necessary sowing winter rapeseed before the end of August to be sure that the crop will not be damaged during a frosty winter (Bagge and Nordestgaard, 1958, Augustinussen, 1989). In addition to a reduction in seed yield a delay of sowing will cause a poor uptake of mineralized nitrogen during the autumn, which will result in a greater leaching of nitrate to the ground water (Andersson *et al.*, 1958). Sowing of rapeseed in August can be impeded by late harvest of the previous crop, dry soil, which prevent preparing of the seedbed, and lack of time due to harvest work.

The effect of undersowing rapeseed in spring barley on yield and development of both crops and on the nitrogen transformation was therefore examined in three experiments during the years 1989-92. The rapeseed was sown: 1. at the same time as the barley (mean of three expts 2 April), 2. two weeks after the germination of barley (mean 29 April), 3. at "normal" time (mean 21 August) and 4. late (mean 7 September).

N-fertilization in the autumn was zero or 30 kg of calcium-ammoniumnitrate per ha supplied at third sowing time or three weeks later. Three varieties of winter rapeseed were sown: Ceres, Liporta and Cobra.

## EXPERIMENTAL

Plant density

The germination of the rapeseed sown in the spring was reduced, as the soil was rather dry, especially at the second sowing time. Although the winters were very mild, the wintering of the spring sown rapeseed was only 63–75 per cent, and therefore the plant density in the spring was rather low as shown in table 1. The Autumn sown rapeseed had a good wintering and a satisfactory plant density.

Table 1. Wintering and plant density in spring

Sowing date	Wintering, per cent			Plants/m <sup>2</sup> , spring		
	Ceres	Liporta	Cobra	Ceres	Liporta	Cobra
2 Apr.	63	71	64	49	52	42
29 Apr.	73	75	72	35	37	28
21 Aug.	91	92	89	105	94	94
7 Sep.	80	85	80	98	102	91

Effect on cover crop

Rapeseed sown at the same time as the barley developed rather quickly, and many plants flowered during the first year. These plants competed with the barley crop for light and reduced the grain yield with about 14 per cent in average. Liporta reduced the yield of barley a little more than Ceres did. When sown two weeks after the germination of barley most rapeseed plants remained at the rosette stage, and the reduction of grain yield was less than 2 per cent.

N uptake in the crop and N residuals in the soil

About 1 September the spring sown rape had taken up some 25 kg N per ha and at the end of November the amount was increased to 60 kg without N-supply and 75 kg, when the crop was supplied with 30 kg of N per ha. For rape sown in August the amounts were 40 and 62 kg per ha, respectively, and for rape sown in September they were 14 and 28 kg per ha. The effect of N supplied about 21 August or three weeks later was equal. During the winter there was a small additional uptake of N, 15–20 kg per ha in rape sown in August and about 5 kg in late sown rape. This is due to the mild winters, often the N content of the plants will decrease during the winter.

At the end of August the amount of nitrate N present in the soil to one metre depth was 43 kg per ha as an average. In uncovered soil there was 63 kg before and 53 kg per ha after the winter period. Rape crops sown in the spring or in August reduced the content to 8–12 kg per ha, whereas the amount was nearly as high as in

uncovered soil, when the rape was sown in September.

### Yield of rape seed

The highest seed yields were obtained at sowing in April two weeks after the germination of the cover crop and at sowing in August (table 2). Lower yields were obtained at sowing in early April together with the cover crop or at sowing in September. Supply of N-fertilizer during the Autumn produced increased yield at sowing in the Autumn but not at sowing in the Spring. In average of all treatments Ceres produced the highest yield while Cobra yielded 1 hkg and Liporta 3 hkg per ha less. The low mean yield of Cobra was due to a very low plant density at sowing in early April.

Table 2. Yield of rape seed, hkg/ha, 91% DM. Mean of 3 expts, 1989-92.

Sowing date	N, kg/ha	Ceres	Liporta	Cobra	Mean
2 April	*	29.4	24.8	27.5	27.2
29 April	*	33.1	28.7	28.4	30.1
21 Aug.	0	31.2	28.4	32.0	30.5
21 Aug.	30	34.3	30.0	34.6	33.0
7 Sept.	0	27.5	27.5	26.8	27.3
7 Sept.	30	29.4	28.1	30.0	29.2
Mean		31.1	27.9	30.0	

\* Mean of 0 and 30 kg N per ha

It is possible to obtain an acceptable yield of rape seed when the rape crop is established by undersowing in spring barley about two weeks after the germination of this crop. It is important that the moisture content of the soil is high enough for germination. Any weed control must be carried out before sowing of rapeseed.

### REFERENCES

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