INFLUENCE OF PRECEDING CROP, SITE AND NITROGEN MANAGEMENT ON YIELD OF ORGANIC OIL SEED RAPE (*Brassica napus* L.)

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Financed by SLU EkoForsk

Background

- Increasing demand of organic oil seed products, € 0,65 per kg seeds.
- Low yields in organic winter oilseed rape (WOR) cropping often explained by low nitrogen (N) availability.
- High WOR N demand when the growth starts early in spring.
- Usually low soil net N mineralisation early in spring.
- Risk for slow N release from organic fertilisers and consequently low N effect at spring application in winter crops. Dry spring in many areas.

Objectives was to study.....

- The importance of autumn application of organic nitrogen fertilisers for the yield level of organic WOR.
- The importance of spring application of organic nitrogen fertilisers for the yield level of organic WOR
- How optimum N rate in spring was affected by N availability in soil and yield level

Materials & methods

Two factors
Ten treatments
Four replicates
12 experiments

Application in autumn:
0 or 50 kg N/ha
(Biofer 10-3-1)

Application in early spring:
0, 50, 100, 150 or 200 kg N/ha
(based on total N) as
Vinasse (4 % N).

Sampling and analyses

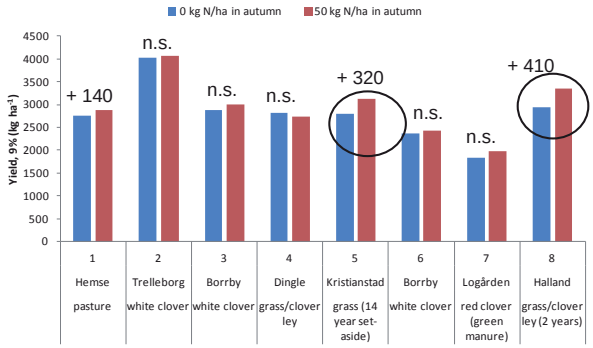
- Yields and analyses of seed quality.
- N uptake in late autumn, early spring and at flowering determined by crop sampling and analyses.
- Soil mineral N in 0-90 cm at establishment, late autumn, early spring, and at harvest.

Site information

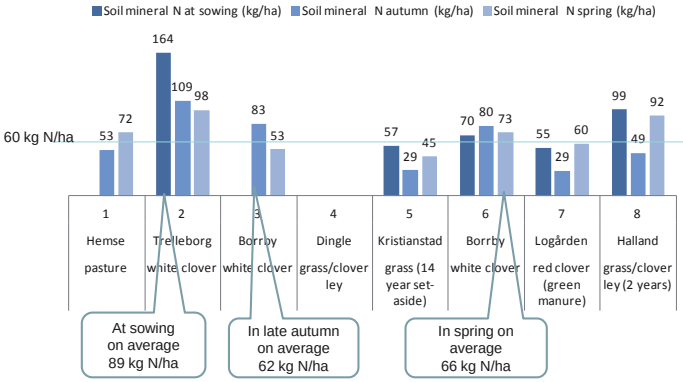
Year	2008/2009				2009/2010			
Experimental site	1 Hemse	2 Trelleborg	3 Borrby	4 Dingle	5 Kristian-stad	6 Borrby	7 Logård-en	8 Halland
Preceding crop	Pasture	White clover	White clover	Grass-clover ley	Grass (14 year set aside)	White clover	Green manure (red clover)	Grass-clover ley (2 years)
Soil	Silt	Silt	Sand	Silt	Sand	Sand	Silty clay	Sand
Sowing	15 Aug.	1 Sep.	1 Sep.	25 Aug.	20 Aug.	27 Aug.	20 Aug.	19 Aug.
Fertilisation autumn	4 Sep.	17 Sep.	11 Sep.	-	3 Sep.	16 Sep.	8 Sep.	18 Sep.
Fertilisation spring	8 Apr.	8 Apr.	8 Apr.	-	31 Mar.	8 Apr.	15 Apr.	28 Apr.
Variety	*Cadillac*	*Carousel*	Calypso	Calypso	Calypso	Hornet	Calypso	Hornet

N applied in autumn (3-18 Sept)

increased yields mainly after grass set-aside and grass-clover ley as preceding crops!

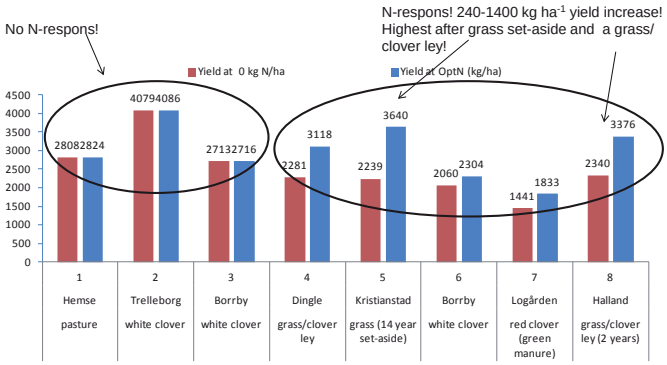


Soil mineral N at sowing, late autumn and early spring were high!



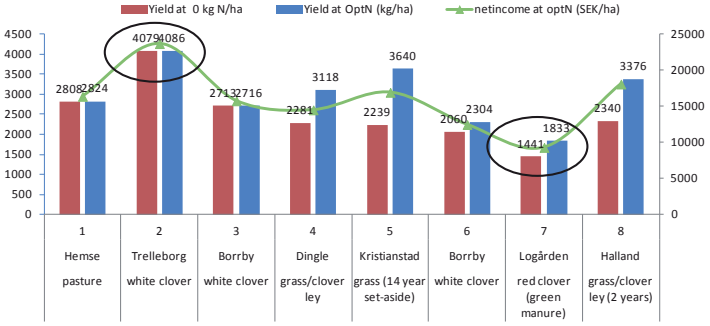
N applied in spring increased yield

700 kg ha^{-1} on average for 5 sites (p< 0,01)!

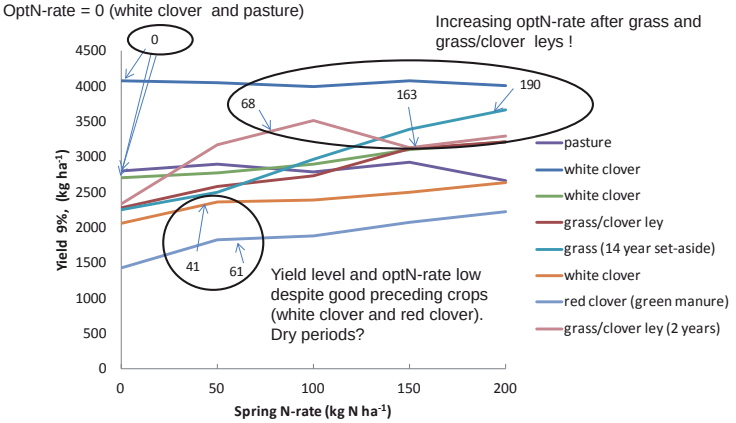


Net income

(seed price 6 SEK/kg, Vinasse 22 SEK/kg N, drying and transport costs 0,2 SEK/ha)

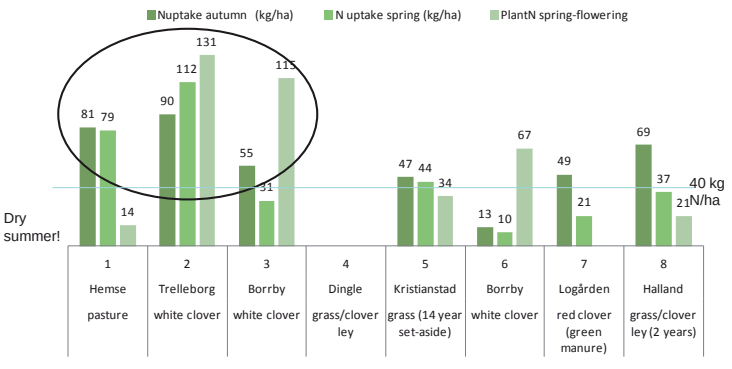


Optimum N-rate in spring and yield response



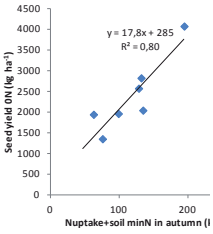
N-uptake and plant available N in soil spring-flowering (plantN)

(= N-uptake at flowering – N-uptake in spring in unfertilised crop)

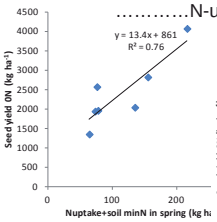


Seed yield of unfertilised crop was well correlated (p< 0.05) to …….

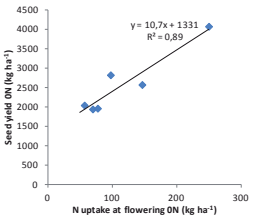
……soil mineral N + N-uptake in late autumn



……soil mineral N + N-uptake in spring



……N-uptake at flowering (0N treatment)



Showing that the yields in 0N treatments describe the N availabilty in soil at a site!

The variation in optimum N-rate in spring could be explained by N-uptake in autumn, soil mineral N in autumn and yield!

Factors (multiple regression)	Equation Y = optimum N	R^2 (adj)
N-uptake in autumn (x_1) Soil mineral N in autumn (x_2) Yield at optimum (x_3)	$Y = 49 - 1.8x_1 - 1.9x_2 + 0.07x_3$	0.93**

Conclusions

- Autumn N fertilisation (in Sep) can not be recommended to organic WOR with good preceding crops (white clover, pasture and red clover) and late sowing date.
- Spring N fertilisation with Vinasse can be recommended since yield increased on average 700 kg at five sites.
- Optimum N –rate in spring varied greatly and should be estimated site specifically.
- To calculate optimum N-rate in spring N uptake and soil mineral N in autumn and yield level should be considered.