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

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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

- 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
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

<table>
<thead>
<tr>
<th>Year</th>
<th>2008/2009</th>
<th>2009/2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental site</td>
<td>1 Horne</td>
<td>2 Trelleborg</td>
</tr>
<tr>
<td>Preceding crop</td>
<td>Pasture</td>
<td>White clover</td>
</tr>
<tr>
<td>Soil</td>
<td>Silt</td>
<td>Silt</td>
</tr>
<tr>
<td>Fertilisation autumn</td>
<td>4 Sep.</td>
<td>17 Sep.</td>
</tr>
<tr>
<td>Fertilisation spring</td>
<td>8 Apr.</td>
<td>8 Apr.</td>
</tr>
<tr>
<td>Variety</td>
<td>Cadillac Carousel</td>
<td>Calypso</td>
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</tbody>
</table>
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)

Optimum N-rate in spring and yield response

Net income (seed price 6 SEK/kg, Vinasse 22 SEK/kg N, drying and transport costs 0.2 SEK/ha)

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 

showing that the yields in 0N treatments describe the N availability in soil at a site!

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.

Factors

<table>
<thead>
<tr>
<th>Factors (multiple regression)</th>
<th>Equation</th>
<th>R² (adj)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-uptake in autumn (x₁)</td>
<td>Y = 49 - 1.8x₁ - 1.9x₂ + 0.07x₃</td>
<td>0.93**</td>
</tr>
<tr>
<td>Soil mineral N in autumn (x₂)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yield at optimum (x₃)</td>
<td></td>
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</tbody>
</table>

Thankyou!

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The farmers who let us run the experiments in their fields.

The staff at the experimental stations.