# Nitrogen management strategies in organic seed production of Timothy (*Phleum pratense* L) and Festulolium (*Festuca arundenacea* x *Lolium multiflorum*)

*Ann-Charlotte Wallenhammar[1,3], Eva Stoltz[1] and Åsa Käck[2]*

*[1]HS Konsult AB, PO Box 271, SE 701 45 Örebro, [2]HS Väst, Vänersborg, [3]SLU, Department of Soil and Environment, Precision Agriculture and Pedometrics, Skara, Sweden*

## Introduction

Organic seed production has increased in Sweden during the past ten years, and constitutes more than 20 % of the total herbage seed acreage. The availability of N during important stages of crop development is detrimental for the final yield. Several organic fertilizers are available on the market for organic crop production. The objective of this study was to investigate the effects of different N strategies and the efficiency of organic N fertilizers in seed crops of timothy and festulolium.

## Method

Four field experiments of timothy and four of festulolium were conducted in central Sweden (58°-59° N) 2008-2010. Four amendments were used; Vinass, a liquid by-product from yeast production, Biofer 10-3-1, a pelleted product of meat and bone meal, dairy slurry and biogas slurry from household compost. In timothy, 50 kg $ha^{-1}$ N and 90 $ha^{-1}$ N were applied at the onset of regrowth in late April. In festulolium, the amendments were applied at a rate of 60, 80 and 100 kg $ha^{-1}$ N early in April and in treatment E and I 140 $ha^{-1}$ N was applied in September (Table 1 and 2).

***Table 1.*** Means of seed yield, lodging and number of ears in four field experiments of timothy (first year seed crops), 2008-2009

| Treatment (kg $ha^{-1}$ nitrogen and time of application) | Yield 15% wc (kg $ha^{-1}$) | Rel yield | Lodging (0-100) | Ear (no.$m^{-2}$) |
|---|---|---|---|---|
| A. Unfertilized | 415 d | 100 | 0 | 465 |
| B. Dairy slurry 50 $NH_4$-N spring | 623 abc | 150 | 2 | 657 |
| C. Dairy slurry 90 $NH_4$-N spring | 690 a | 166 | 15 | 731 |
| D. Biofer 10-3-1 50 N spring | 572 c | 138 | 6 | 655 |
| E. Biofer 10-3-1 90 N spring | 619 abc | 149 | 9 | 626 |
| F. Biogas slurry 50 N spring | 574 bc | 138 | 12 | 527 |
| G. Biogas slurry 90 N spring | 677 ab | 163 | 47 | 578 |
| H. Vinass 50 N spring | 598 bc | 144 | 11 | 608 |
| I. Vinass 90 N spring | 614 abc | 148 | 41 | 685 |
| *CV, %* | *10.3* | | *25.5* | *17.6* |
| *Prob F1* | *0.0001* | | *NS* | *NS* |
| *LSD F1* | *90* | | | |

***Table 2***. Means of seed yield. Lodging and number of ears in one field experiment of festulolium cv Hykor (first year seed crop), Skänninge 2009

| Treatment (kg $ha^{-1}$ nitrogen and time of application) | Yield 15% wc (kg $ha^{-1}$) | Rel yield | Lodging (0-100) | Ear (no. $m^{-2}$) |
|---|---|---|---|---|
| A. Unfertilized | 228 e | 100 | 0 f | 1103 c |
| B. Vinass 60 N autumn + 60 N spring | 608 c | 267 | 42 b | 1226 bc |
| C. Vinass 60 N autumn + 80 N spring | 751 ab | 330 | 69 a | |
| D. Vinass 60 N autumn + 100 N spring | 635 b | 279 | 72 a | |
| E. Vinass 140 N autumn | 796 a | 350 | 40 b | 1621 a |
| F. Biofer 10-3-1 60 N autumn + 60 N spring | 459 cd | 202 | 6 ef | |
| G. Biofer 10-3-1 60 N autumn + 80 N spring | 430 d | 189 | 9 e | |
| H. Biofer 10-3-1 60 N autumn + 100 N spring | 567 b | 249 | 16 d | 1493 ab |
| I. Biofer 10-3-1 140 N autumn | 680 abc | 299 | 24 c | |
| *CV, %* | *16.9* | | *7.0* | *9.3* |
| *Prob F1* | *0.0001* | | *0.05* | *0.05* |
| *LSD F1* | *141* | | *7* | *324* |

## Results

In timothy the highest yield was received at 90 $ha^{-1}$ N as dairy slurry, however, it was not significantly different from the other treatments at the same rate. In the first year seed crop of Hykor the highest yield was received at a rate of 140 N $ha^{-1}$ as Vinass applied in autumn, whereas in the second year seed crop the highest yield was found at 80 N $ha^{-1}$as Biofer 9-4-0 in autumn and 100 N $ha^{-1}$ as Vinass in spring (results not shown here).

## Conclusions

- All amendments increased seed yield significantly in both timothy and festulolium.
- There was an overall tendency that spring application of Biofer was less effective than Vinass.
- High rates in autumn (80-140 N) are preferably applied in festulolium.
- The N-uptake is efficient as the levels of soil mineral N at harvest were low (10-15 kg N $ha^{-1}$).

Hushållnings sällskapet

**This study was financed by the Swedsih Board of Agriculture**