



Starting with quality seed for low impact cultivation: nitrogen fertilization schedule in a wheat seed crop affects the growth parameters of offspring seedlings

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Introduction

- High-quality seed is needed for successful crop establishment in view of a low impact cultivation
- The total rate and timing of N application in a wheat crop affect grain assimilate accumulation

AIM: evaluate whether and how N fertilization rate and timing in a wheat seed crop can affect the germination performance and seedling vigour of offspring seeds

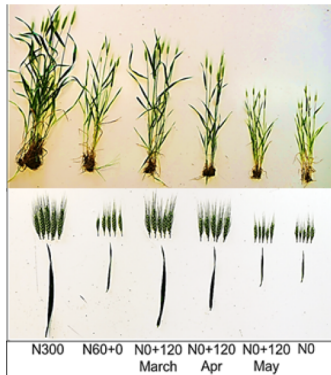
Materials and Methods

Seed crop: 2 cultivars of *T. aestivum* x 6 N treatments
split-plot design with 4 reps (randomized blocks)

- Cv. Bora X
- Cv. Bologna
- **N300:** 300 kg N ha⁻¹ (60 kg x 5) from Dec to Apr
- **N60+0:** 60 kg N ha⁻¹ on mid December
- **N0+120March:** 120 kg N ha⁻¹ on mid March
- **N0+120April:** 120 kg N ha⁻¹ on early April
- **N0+120May:** 120 kg N ha⁻¹ on early May
- **N0:** never N fed.

Offspring seeds: 12 treatments x 4 reps (trays) - randomized blocks
Germination in distilled water
Dark/light as 8/16 h (200 μmol photons m⁻²s⁻¹)

Measurements: germination performance, growth parameters
pigment contents, several vegetation indexes (VIs)



Plants, spike, flag leaf (above) and offspring seedlings (below) for the six N treatments of one cultivar



Results

- The two wheat cultivars differed for seedling growth parameters, pigment contents and VIs, but this was expected and will not be presented here (data not shown).
- The N fertilization schedules affected several seedling growth parameters (Table 1).
- Seedlings of N300, N0+120Mar, N0+120Apr and even N0+120May showed significantly greater growth and chlorophyll content as compared to N fed very early or never (N60-0 and N0).
- Late N fertilization caused a grain yield in the seed crop as lower as later was the N application (data not shown), thus a unique very late N application is not recommendable. However, it is of relevance that this did not depress the vigour of offspring seedlings.
- No significant differences were observed for NDVI (Table 1) and other VIs (data not shown). This because other factors, besides the N related traits, likely come into play at the seedling stage.

Table 1. Germination percentage (G, %), mean germination time (MGT, d), individual shoot length (L, mm), fresh weight (FW, mg), and dry weight (DW, mg), contents (μg shoot⁻¹) of chlorophyll A and B (ChlA and ChlB, respectively), carotenoids (Car), and NDVI as affected by N fertilization schedules (averaged over the two cultivars). See text for labels.

N treatments	G	MGT	L	FW	DW	ChlA	ChlB	Car	NDVI
N300	97	1.40	112	54.6	8.65	75.3	43.2	12.9	0.761
N60+0	96	1.30	93	47.0	7.71	63.3	34.2	12.5	0.783
N0+120March	94	1.38	100	51.4	8.51	56.4	30.9	10.1	0.784
N0+120Apr	96	1.41	104	51.8	8.45	64.1	34.6	11.8	0.775
N0+120May	93	1.32	108	56.7	8.75	66.0	32.3	12.0	0.786
N0	96	1.31	94	44.3	7.20	55.2	29.1	10.6	0.764
Significance of ANOVA	-	n.s.	**	**	**	*	**	n.s.	n.s.
LSD	0.11	8.3	4.3	0.72	10.1	6.7	2.5	0.027	

* $p < 0.05$; ** $p < 0.01$; n.s. not significant.

Conclusions

- Wheat seedling vigour was increased by N fertilization to the seed crop.
- Very late (i.e., at active shoot elongation) or extremely late (i.e., at pollination) N application to a crop previously grown with severe N deficiency, allowed to obtain a seedling vigour comparable to that of seedlings obtained from crops well N fed throughout the growth cycle.
- Further research is scheduled to evaluate the effect of N treatments in the seed crop on seedling phytochemical content for obtaining edible sprouts & wheatgrass with high nutritional value.

References

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