Critical nitrogen-dilution curves for rice in Uruguay

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Introduction

Uruguayan rice yield is on the top-five of the world. This productivity is achieved with a high nitrogen use efficiency (> 100 kg kg^{-1}) compared with other rice systems. The most frequent stages for N fertilization are at early tillering (ETI) and panicle initiation (PI). The critical dilution N curves (CDNC) is a technology which relates the dry matter (DM) and the N concentration (%), which can be used as an assessment of the N status during the crop when the DM is higher than 1.5 Mg ha^{-1} (Justes et al. 1994).

Objective

Generate the first data set from a population with different N status and compare the best productive treatments with published CNDC.

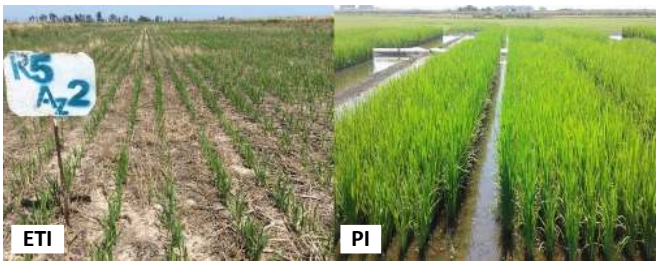
Material and Methods

Ideotypes: Indica (INIA Merin) and Japonica (Parao).

Experimental design: split plot design with 3 replications; big plot - the N fertilization at ETI; small plot – N at PI.

N doses: 4 evaluated at TI and PI respectively, resulting in 16 N treatments, ranging from 0 to 200 kg ha^{-1}.

Biomass was collected every 15 days. From that samples we calculated dry matter (DM) and sent a sample to the lab for nitrogen concentration analysis. Statistical differences were determined using the Fisher test (P≤ 0.05).

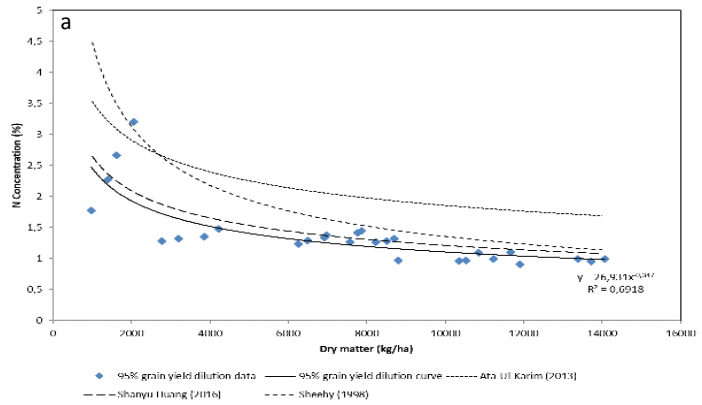


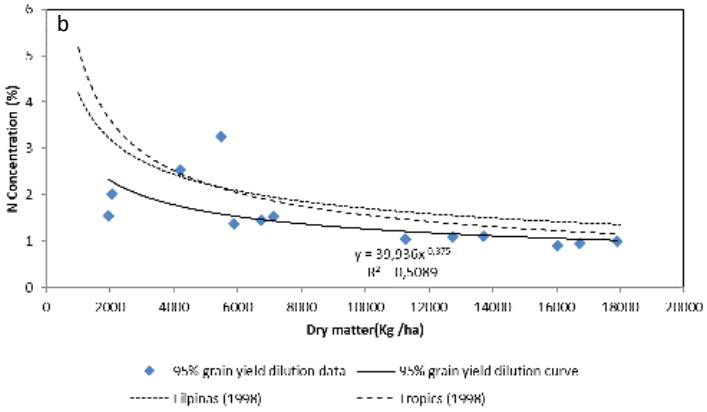
Results

Dry matter accumulation showed statistical differences only to N fertilization at ETI. Plant N concentration and grain yield responded to both N fertilization moments, ETI and PI, while no interaction were detected.

	N Dose (ETI)	Dry matter accumulation					Yield	
		15DBP	PI	15DAPI	30 DAPI	50 DAPI	N Fertliz -ETI	N Fertliz -PI
		kg ha^{-1}						
INIA Merin	0	931 D	1950 D	4301 C	9797 C	13022 C	10630 C	11377 B
	25	1516 C	2827 C	5158 B	11363 B	14827 B	11840 BC	11545 B
	50	1943 B	4193 B	5662 B	12245 B	15581 B	12541 AB	12363 A
	100	2068 A	5486 A	7127 A	14120 A	18028 A	12909 A	12642 A
Parao	0	971 C	2273 D	6196 C	8791 C	_____	10685 C	10522 B
	25	1396 B	3196 C	6915 BC	10668 B	_____	11155 BC	11458 A
	50	1617 A	3859 B	7286 AB	11772 AB	_____	11681 AB	11599 A
	100	2058 A	4222 A	8033 A	12943 A	_____	11957 A	11898 A

A dilution equation with treatments that reached more than 95% of the maximum yield was generated for each variety (a: Parao; b: INIA Merin), and plotted against international published CNDC.





Conclusions

While for INIA Merin the dilution curve was lower (DM and N concentration) than international data, for Parao were close related. Maybe the similarity among climatic conditions of both locations explain the behavior in Parao. In contrast for INIA Merin, CNDC data were generated in a different climate than Uruguay.

Results from this first dataset suggest that more research must be conducted in order to generate CNDC for Uruguayan conditions, basically for INIA Merin. The exploration of higher N doses than used in this experiment will help to adjust a model were a critical N concentration for each DM content could be adjusted and a CNDC could be calculated.

References

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