

# **THE APPLICATION OF FERTILIZER USING MANAGEMENT ZONE (MZ) IN PAMPAS SOILS WITH TEXTURE VARIABILITY AFFECTS RESIDUAL NITRATE AFTER HARVEST.**

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## **ABSTRACT**

The use of management zones criteria (MZ) was studied under field conditions to reduce the risk of nitrate leaching during corn in western Argentinean Pampas. The soil nitrate levels in depth and N crop response to fertilization were measured at harvest. The results indicated that, when compared to uniform management (UM), the MZ criteria could minimized the soil residual nitrate.

**Keywords:** management zones criteria (MZ), Maize, N fertilization.

## **INTRODUCTION**

The maize yields and soil nitrate distribution in depth are usually associated with soil texture heterogeneity in western Argentinean Pampas. In this area the uniform fertilizer management (UM) increased the risk of nitrate leaching due to over-fertilizing (Rimski Korsacov et al., 2004). Nevertheless, this risk could be minimized by using management zones criteria (MZ) (Delgado et al., 2005).

## **MATERIALS AND METHODS**

In a field experiment, the nitrates distribution in soil depth (0-1.80 m) at sowing and harvest times (residual Nitrate) and the maize response to N fertilizer were determined. The experimental area was divided into UM and MZ fields. The MZ fields were arranged by texture and organic matter content and were split into subfields as high production zones (HP)(coarse silty loam texture) and low production zones (LP) (coarse loam texture). Both MZ and UM received 2 treatments with three replications each: unfertilized (control) and fertilized (N rate calculated according to N balance). Soil nitrate levels in depth, crop N response to fertilization and N absorption by maize were measured at harvest.

## **RESULTS AND DISCUSSION**

The maize yields varied from 7.9 to 11,1 T ha<sup>-1</sup> and from 7.5 to 9.7 T ha<sup>-1</sup> for HP and LP respectively. Rates higher than 245 kg N ha<sup>-1</sup> and 200 kg N ha<sup>-1</sup> significantly increased the N absorption by grain in HP and LP zones respectively (Table 1). Residual Nitrate also varied between zones in the 0-1 m soil depth. Residual Nitrate level in the LP fertilized zone was similar to control and lower

than UM (Figures 1 A and 1 B). In the HP fertilized zone, the residual Nitrate level was two times higher than the control and the UM.

**Table 1.** N absorption in plant biomass and grain in HP and LP zones (high production and low production zones respectively).

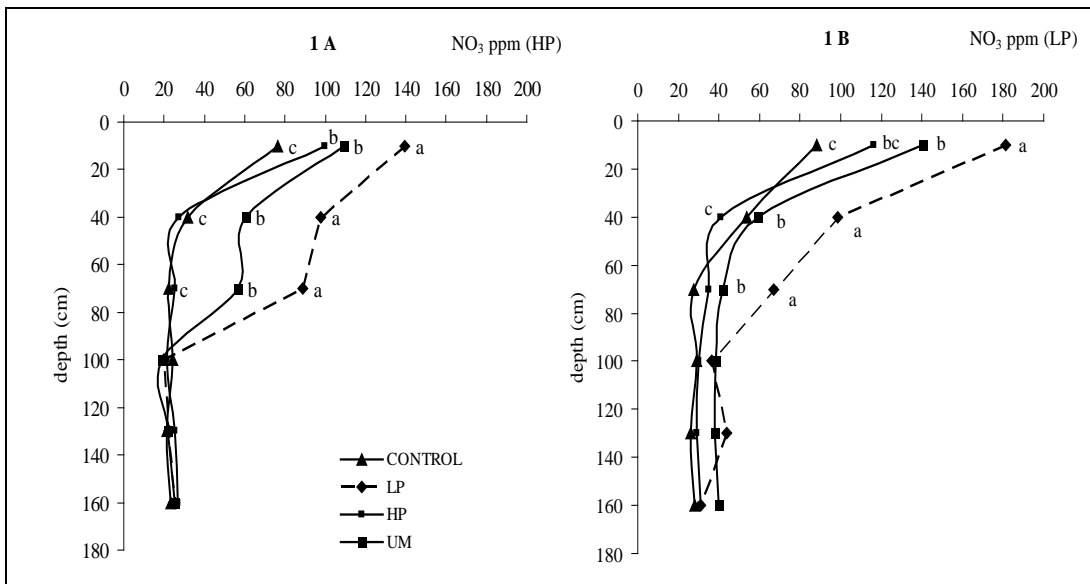
N rate (kg N ha <sup>-1</sup> )	N concentration (gN kg <sup>-1</sup> )			
	HP		LP	
	grain	plant biomass	grain	plant biomass
0	40.1 a	15.0 a	30.1 a	9.8 a
200	47.1 a	27.1 b	38.1 b	19.2 b
245	54.2 b	32.0 c	42.4 b	25.2 c
270	56.3 b	33.1 c	71.0 c	26.0 c

Different letters means significant differences between rates (p<0.05%)

2005).

These results can be attributed to the high N rate (240 kg N ha<sup>-1</sup>).

Nevertheless, in the 1 – 1.8 m depths the nitrate content in both zones did not vary when compared to control and UM. This fact suggests that residual Nitrate in HP remained in the upper layer during the maize but represents risk of nitrate leaching in future (Delgado and Bausch.,



**Figures 1 A and 1 B.** Soil nitrate levels distribution in depth to HP and LP zones (high production and low production respectively). Different letters means significant differences between depths (p<0.05%)

These results indicates that the fertilization by using MZ can minimized the residual Nitrate as compare to the UM if N is applied in its optimum rate, especially when high yields are expected.

## REFERENCES

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