

Visions for a Sustainable Planet

ASA, CSSA, and SSSA International Annual Meetings
Oct. 21-24, 2012 Cincinnati, Ohio

NITROGEN FERTILIZERS IN CORN PRODUCTIVITY AND NUTRITIONAL FOLIAR COMPOSITION

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➤ Brazil → urea is the most used source of N in agriculture;



Figure 1. Fertilizers application and leaf sampled Experiment:

➤ Randomized complete block (4 replications);

➤ No tillage;

➤ 100 kg ha⁻¹ of N applied in surface application in 2010 under corn residue and in 2011 under soybean residue.

➤ N sources: urea (U), urea + 15% (m/m) zeolite (UZ), ammonium nitrate (AN), urea coated with boric acid and copper sulfate (UC), mixes of ammonium sulfate (33.3%) + urea (66.7%) (AS+U) and ammonium sulfate (33.3%) + urea coated (66.7%) (AS+UC) and a control (without N).

Table 1. Production aspects evaluated

	Grain Yield		Mass of 1000 grains		Height of ear insertion		Crude Protein		N exported by grain	
	kg ha ⁻¹	kg ha ⁻¹	g	g	cm	cm	%	%	kg	kg
	2009/10	2010/11	2009/10	2010/11	2009/10	2010/11	2009/10	2010/11	2009/10	2010/11
Control	5188 b	9342 a	294.2 a	360.2 a	105 b	119 a	7.4 a	9.3 a	61.0 b	140.3 a
UC	6273 ab	9870 a	303.2 a	368.6 a	114 a	126 a	8.1 a	9.3 a	81.9 ab	147.5 a
AN	5288 b	9338 a	305.5 a	373.3 a	116 a	126 a	8.6 a	8.9 a	72.4 ab	132.4 a
AS+U	5658 b	9853 a	302.8 a	369.3 a	114 a	127 a	8.6 a	9.3 a	77.8 ab	145.8 a
AS+UC	7448 a	9679 a	287.3 a	382.1 a	113 a	126 a	8.5 a	9.3 a	93.6 a	142.8 a
U	6278 ab	9766 a	298.5 a	379.9 a	120 a	125 a	8.7 a	8.9 a	86.3 a	138.4 a
UZ	5795 b	9331 a	280.0 a	373.1 a	119 a	127 a	8.0 a	9.5 a	74.0 ab	142.1 a
c.v.	9	8	4.5	3.2	3	3	10.8	8.21	12.7	11.31

➤ Average productivity in 2009/10 (Contrast analyses, p<0.01) obtained superiority of 952 kg ha⁻¹ for treatments with urea compared to control.

➤ 2009/10 → Superiority of 816 and 644.4 kg ha⁻¹ for AS+UC and UC compared to other treatments with N (p<0.05).

➤ 2010/11 → There was no N fertilization effect compared to control and also for contrasts among N treatments.

➤ Effects of high soil fertility influenced by soybean residue and the climatic condition in 2010/11 resulted in low effects of the N treatments.

➤ Leaf N show effect of N fertilization (Table 2 and 3).

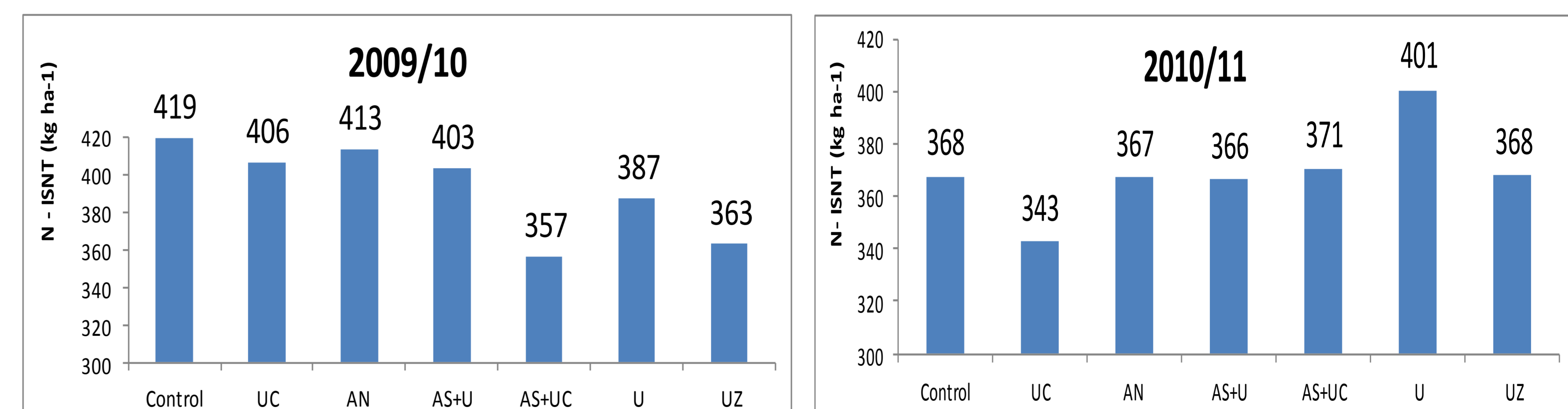
Table 2. Chemical leaf analysis 2009/10

2009/10	N	P	K	Ca	Mg	S	B	Cu	Zn	Mn	Fe
	g kg ⁻¹						mg kg ⁻¹				
Control	26.6 b	2.3 a	25.3 a	5.4 a	2.2 a	1.6 a	16.4 a	10.6 b	35.5 a	67.4 a	152.0 a
UC	31.9 a	2.4 a	24.8 a	5.1 a	2.1 a	1.5 a	16.4 a	11.3 ab	34.5 a	72.5 a	155.5 a
AN	31.9 a	2.6 a	25.5 a	5.0 a	2.2 a	1.6 a	15.6 a	13.3 ab	38.6 a	70.6 a	159.5 a
AS+U	33.3 a	2.4 a	26.0 a	5.0 a	2.1 a	1.6 a	16.4 a	12.4 ab	39.0 a	70.4 a	173.4 a
AS+UC	31.8 a	2.4 a	24.0 a	4.9 a	2.1 a	1.3 a	16.5 a	14.2 a	39.5 a	72.4 a	171.2 a
U	30.9 a	2.5 a	23.8 a	5.0 a	2.1 a	1.4 a	16.3 a	12.6 ab	35.1 a	69.6 a	167.4 a
UZ	31.8 a	2.4 a	25.5 a	5.1 a	2.2 a	1.5 a	16.3 a	14.0 a	38.7 a	68.3 a	148.9 a
CV	5	6	8	7	6	14	4	10	18	5	11

Table 3. Chemical leaf analysis 2010/11

2010/11	N	P	K	Ca	Mg	S	B	Cu	Zn	Mn	Fe
	g kg ⁻¹						mg kg ⁻¹				
Control	30.1 b	2.4 a	21.2 b	5.6 a	3.1 a	1.9 a	17.1 a	5.1 a	15.2 a	61.4 a	187.5 a
UC	34.3 ab	2.5 a	22.7 ab	4.9 ab	2.7 a	2.1 a	16.8 a	4.3 a	15.5 a	62.0 a	176.8 a
NA	34.2 ab	2.5 a	24.7 ab	5.2 ab	2.9 a	2.1 a	17.4 a	5.4 a	18.5 a	65.0 a	193.6 a
AS+U	33.4 ab	2.5 a	24.5 ab	4.5 b	2.8 a	2.2 a	17.2 a	4.3 a	15.5 a	64.6 a	171.8 a
AS+UC	33.8 ab	2.5 a	25.9 a	4.9 ab	2.9 a	2.1 a	17.2 a	4.6 a	14.8 a	62.2 a	205.8 a
U	35.6 a	2.5 a	22.9 ab	4.9 ab	2.7 a	1.9 a	17.1 a	5.6 a	16.5 a	71.9 a	186.5 a
UZ	35.0 a	2.5 a	23.2 ab	5.5 a	3.0 a	2.2 a	17.4 a	4.6 a	14.4 a	65.5 a	232.1 a
CV	4.39	3.26	7.83	6.44	11.13	14.04	2.57	25.25	10.39	8.6	11.8

➤ ISNT detected no effect of N treatments however it detected high organic nitrogen levels (Figures 1 and 2).



Figures 2 and 3. Illinois Soil Nitrogen Test (ISNT) in soil 0-20 cm

In conclusion, in no tillage with high fertility soil under appropriate climatic condition showed lower capacity to distinguish different nitrogen fertilizers.

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