UREA STABILISERS IMPROVE NITROGEN UTILIZATION AND YIELD ON WATER TABLE SOILS

***Dr FG Adriaanse*, for Kimleigh Chemicals SA (Pty) Ltd**

The effectiveness of Kimleigh's nitrogen stabilisers for maize production has previously been illustrated with statistically and economically proven trial results, obtained in the Rysmierbult geographical area (SA Grain, July 2021).

These results were obtained on well-drained sandy soils and after this, the question arose whether similar reactions would be obtained on poorly drained water-table sandy soils in the Kroonstad area. Kimleigh manufactures two forms of urea stabilizers:

1 Urease inhibitor that reduces the volatilization and toxic effects of urea (**AZANON® U**)
2 Nitrification inhibitor that reduces the leaching of nitrogen (N) (**InnoX**)

These two products have also been combined into one product, which is known as **DetaiN**.

The effectiveness of urea treated with DetaiN versus untreated urea and a control that received no N after planting was tested in a statistical trial, with four replicates. The trial was planted on 28 December 2022 with the maize cultivar PAN5B-49 at a plant population of 22,700 and a row width of 1.5 m.

With planting, 34 kg N/ha, 34 kg P/ha and 34 kg K/ha were banded on all plots. Treated and untreated urea were broadcast at 92 kg N/ha, 35 cm from plant rows, in bands, 22 days after planting and soil incorporated shallowly. Grain yield, N content in the soil and N content in leaves were measured.

The yield obtained with DetaiN treated urea was 0.63 tons/ha (9.35%) more than with untreated urea (Graph 1). This yield increase compares well with an increase of 0.439 tonnes/ha (10.8%) previously obtained at Rysmierbult with DetaiN.

The yield difference at Kroonstad was statistically significant at 90% certainty. The cost of treating 92 kg N/ha as urea amounted to approximately R201.48/ha. The net profit increase, at a maize price of R3,800/ton, obtained with DetaiN treatment of urea, was R2,394/ha.

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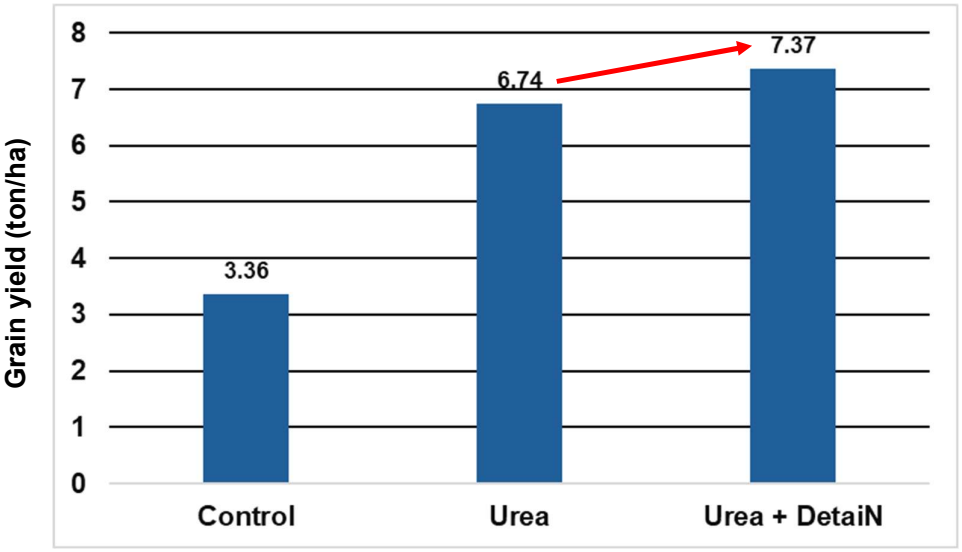
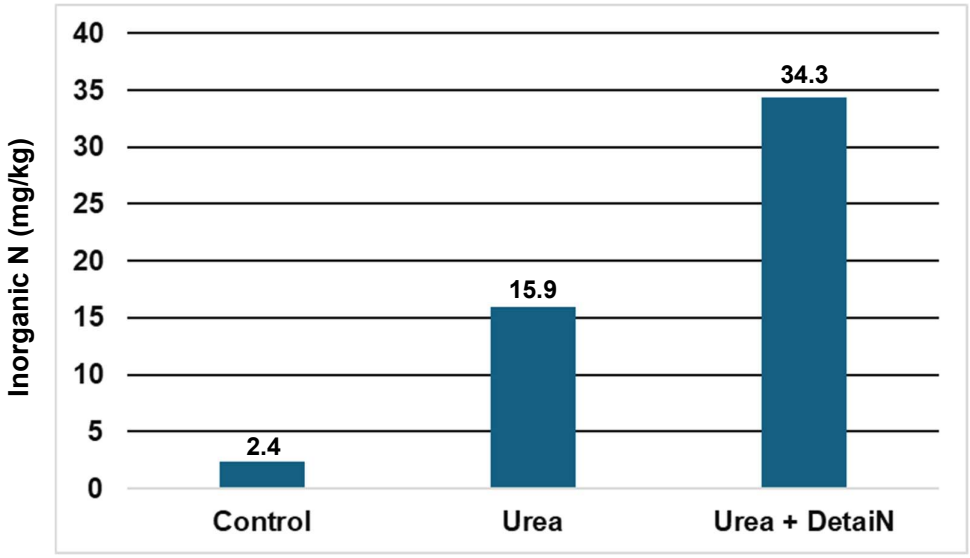
Results



Graph 1: Yield response of urea treated with DetaiN versus untreated urea and a control that received no nitrogen after planting. The N-level was 92 kg N/ha. LSD (P = 0.10) = 0.22 ton/ha (n = 4)

Inorganic N (nitrate-N + ammonium-N) analyses in the top 30 cm of soil, by 44 days after planting are presented in Graph 2. The result of DetaiN treated urea versus untreated urea was an increase of 18.4 mg N/kg or 71.8 kg N/ha at a density of 1.3 kg/m^3. This difference in N content in this soil layer, at this time, is of great significance, because N uptake increases drastically from this growth stage and because most roots are then in this layer of soil. The reason for the difference can be attributed to less N-volatilization and N-leaching due to DetaiN treatment.



Graph 2: Inorganic N in the top 30 cm soil, 22 days after top fertilization; 44 days after planting (n = 3)

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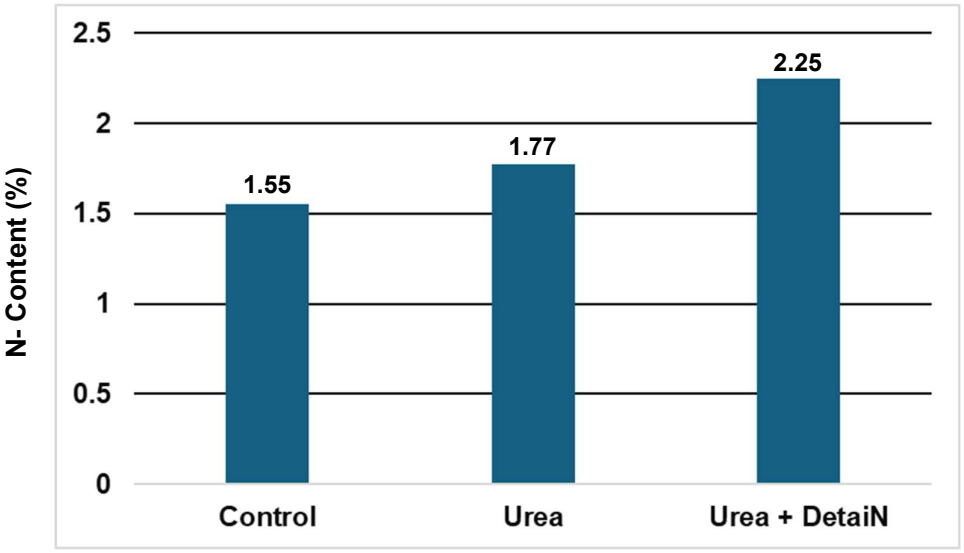
The N content in the leaves for the DetaiN treated urea was significantly higher than for untreated urea, 105 days after planting (Graph 3). This result is an indication that more N was taken up over the growing season when urea was treated with DetaiN. The fact that there was also more N in the soil by 44 days after planting, when urea was treated with DetaiN (Graph 2), is related to this.



Graph 3: N content in leaves, 105 days after planting (n = 3). LSD (0.05) = 0.43%

Conclusions

1. Treatment of urea with DetaiN significantly increased yield, soil-N, and N content in the leaves.
2. Statistically significant yield differences indicate repeatability of results under similar conditions.
3. The yield increase (%) from DetaiN treatments is consistent with previous results obtained on well-drained sandy soils.
4. Suboptimal N-rates and DetaiN-treated urea applications, by no later than four weeks after planting, are prerequisites for the repeatability of similar results.

Contact Kimleigh for locality specific applications.
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