

EFFICACY OF LAN CAN BE IMPROVED BY REDUCING NITROGEN (N) LEACHING

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



LAN (Limestone Ammonium Nitrate) consists of 14% nitrate-N and 14% ammonium-N. The imported equivalent, CAN (27%N) contains the same nitrate-N: ammonium-N ratio.

Both forms of N are available for uptake while only nitrate-N can leach with water to deeper soil layers. Ammonium-N is positively charged and therefore it will bind to the negatively charged clay minerals and not leach.

However, after bacteria, in the presence of oxygen, convert ammonium-N to nitrate-N (nitrification), it will also leach. Thus, inhibiting nitrification will reduce N-leaching, thereby increasing N-uptake and yield.

The effect of the nitrification inhibitor, InnoX on maize yield, was investigated in two field trials. Treatments in one trial consisted of two post-planting N-levels and in another trial of pre-planting and post-planting applications at one N-level. The results of these trials are depicted in Graph 1 and Graph 2, respectively.

Maize yields at 40 kg N/ha and 80 kg N/ha were 0.212 ton/ha and 0.214 ton/ha respectively higher for InnoX treated LAN versus untreated LAN (Graph 1, not statistically significant, at $P=0.15$). The value of yield increases at R4,000/tonne was R848/ha at 40kg N/ha and R856/ha at 80kg N/ha. The cost of InnoX plus coting is R1.35/kg N and therefore R54/ha at 40 kg N/ha and R108/ha at 80kg N/ha. Profit increase for the treatment of LAN with InnoX was therefore R794/ha at 40kg N/ha and R748/ha at 80 kg N/ha. Higher N levels certainly increased yields, but InnoX increased yields and profits at both levels.

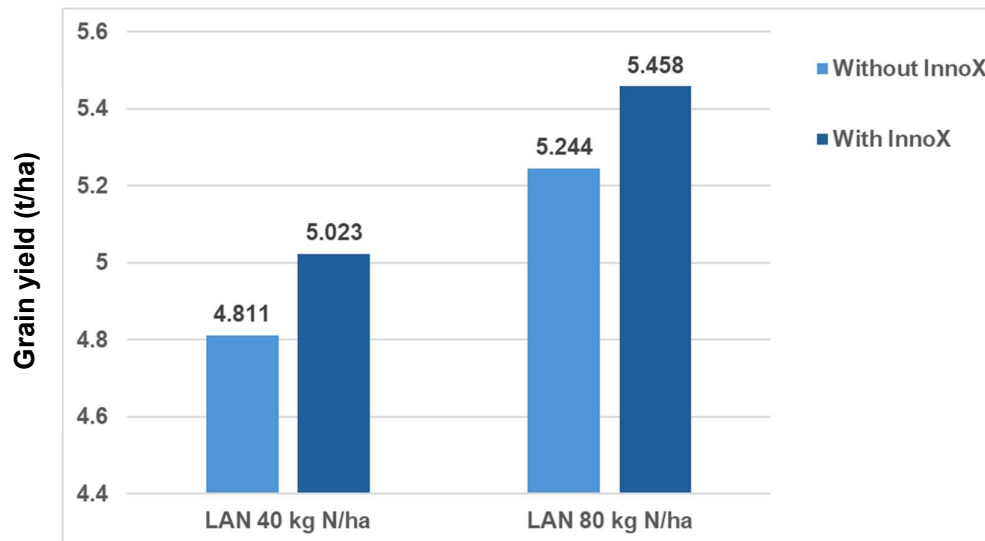
Maize yield increases due to the treatment of 82 kg N/ha were 0.363 ton/ha for pre-plant applications (Graph 2, statistically significant at $P=0.15$) and 0.067 ton/ha for post-plant applications. Its value is R1,452/ha for pre-plant applications and R268/ha for post-plant applications. The cost associated with the treatment of 82 kg N/ha amounts to R110.7/ha. Profit increase for the treatment of LAN with InnoX was therefore R1,341.3/ha for pre-plant applications and R157.3 for post-plant applications. Post-plant applications would rather be recommended, due to less N-leaching losses and therefore higher yield (Graph 2).

By 46 days after planting, maize is well developed to absorb both forms of N in LAN quickly. Still, at late application, it was financially worthwhile to treat LAN with InnoX.

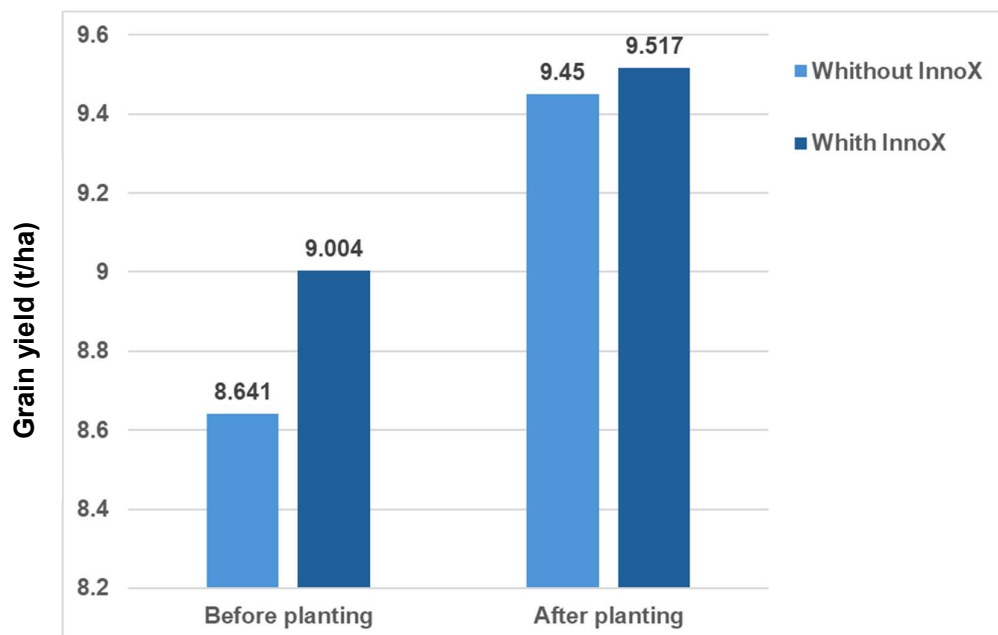
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Results



Graph 1: Yield response of LAN treated with InnoX, versus untreated LAN at two N-levels, applied 46 days post-planting. CV = 7.1%, LSD (P = 0.15) = 0.364 ton/ha. N = 4. Clay in topsoil = 22%.



Graph 2: Yield response of LAN, treated with InnoX versus untreated LAN applied 3 days before planting and 40 days after planting. The N-level was consistently 82 kg/ha. CV = 3.46%. LSD (P = 0.15) = 0.326 ton/ha. N = 4. Clay in topsoil = 8%.

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When, according to common practice, LAN is applied at 21 to 35 days after planting, it will be even more worthwhile, than at 40 or 46 days after planting, to treat LAN with InnoX, because plants are then much less developed and therefore less able to absorb some of the applied N. This statement is confirmed by greater yield response to InnoX treatment for preplant applications (Graph 2).

Conclusions

- LAN treated with InnoX consistently (although not always statistically significant) at different N-levels and N-times of application produced higher yield, which was always more profitable than untreated CAN.
- The financial benefit of LAN treatment with InnoX was greater for early applications but still holds benefit for late applications. Late applications with and without InnoX produced higher yields than early applications.
- LAN treated with InnoX can be applied six weeks after planting or later, while urea treated for volatilization losses with Azanon U, as well as for leaching losses with InnoX, should be applied no later than four weeks after planting, to ensure timely availability of nitrate-N and ammonium-N for uptake.

Contact Kimleigh for locality specific applications.

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Mr Dewald Bothma and Anievaal Boerdery are thanked for carrying out the research.