

Urease inhibitor still active at low concentration

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Abstract

Urease inhibitors (UI) decrease NH₃ volatilization losses but the degradation of UI after urea storage reduces its effectiveness. Urea coated with UI (550 and 733 mg NBPT+NPPT kg⁻¹ urea) stored at 20°C and 30° for up to 12 months was applied to an Oxisol. Ammonia losses from urea varied from 40 to 53% of the applied N and decreased by 33% to 58% with UI. Differences in the effectiveness of UI to reduce NH₃ loss were relatively small from urea freshly treated with UI or stored for 12 months, even if the residual concentrations in samples stored at 30°C were as low as 138 and 213 mg UI kg⁻¹. UI remains relatively effective at much lower concentrations than presently recommended.

Keywords: urease inhibitor, Limus, NBPT, NPPT, NH₃ volatilization.

1. Experimental

In 2018 8.2 Mt of N fertilizer were coated with UI worldwide. UI applied to urea tends to slowly degrade upon storage and degradation increases with increasing temperature (Cantarella et al. 2016). Therefore, it is important to understand how UI at low active ingredient concentration affects NH₃ volatilization.

Urea coated with a mixture of NBPT and NPPT at two rates (550 and 733 mg UI kg⁻¹) was stored at 20°C and 30°C. After time intervals up to 12 months urea was applied to soils in volatilization chambers and NH₃ losses were measured for 30 days.

Urea caused high NH₃ losses: 40% to 53% of the applied N. Addition of UI (no storage) significantly ($P \leq 0.05$) reduced losses by 45 to 59% compared to those of untreated urea, in line with a published meta-analysis of 121 trials (Cantarella et al. 2018). The loss reduction varied from 33 to 57% when urea with UI was stored for more than 5 months,

At low residual UI concentrations, the reduction in NH₃ volatilization was approximately 40% (Fig. 1). Similar results had been reported by Cantarella et al. (2016).

Even at low UI concentration the capacity to reduce losses remained substantial, although the risks of poor performance upon storage for a long time at a high temperature cannot be

neglected. For certain conditions, lower concentrations of UI may be used, which would reduce the costs for the farmer and the load of chemicals in the environment.

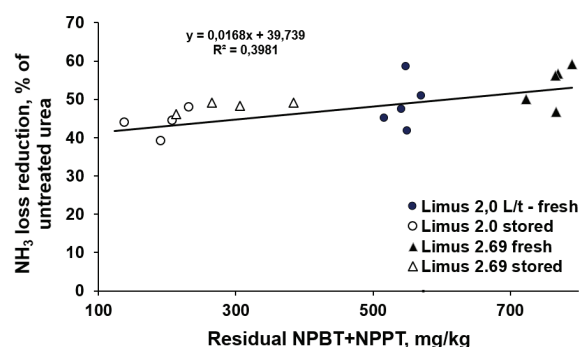


Fig. 1. Residual concentration of UI in urea after different storage times effect on NH₃ volatilization

2. References

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