

Efficacy evaluation of N-Guard (a nitrification inhibitor) on coated urea in MAIZE

Location: Gujarat, India

Duration: 6-8 Weeks

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Summary:

A large percentage of the Nitrogen in nitrogenous fertilizers such as Urea is lost due to the action of nitrifying bacteria and ammonification. This leads to low fertilizer use efficiency, over and above which, this also proves to be an underground environmental hazard as the nitrogen leaches into the ground water.

When Urea is applied to the soil only approximately 33% is actually utilized by the plant. After application to soil, urea hydrolyses rapidly to ammonium carbonate. This ammoniacal form of Nitrogen is subsequently converted to nitrite (NO₂) and then to nitrate (NO₃) by the action of nitrifying bacteria viz. *Nitrosomonas* spp. and *Nitrobacter* spp., respectively. The processes of hydrolysis and nitrification of Urea fertilizer are to a large extent completed in about 15-20 days under most conducive agro climatic conditions. Since the duration of most cultivated crops extends beyond 90-100 days, nitrates formed as a result of the relatively rapid hydrolysis and nitrification of Urea, being highly soluble, and in excess of the limited quantities required by the crops at their early stages of growth, are liable to be leached down, beyond the active root zone of crops. Therefore apart from being directly responsible for a huge monetary loss, it is also an underground environmental hazard through nitrate leaching and ammonification. This gives rise to ground water contamination which poses a serious threat to the environment and human health. However, this problem can be considerably alleviated by treating such nitrogenous fertilizers with N-GUARD.

N-GUARD is a Neem limonoids and Neem bitters based formulation which helps maximize the Nitrogen Use Efficiency of nitrogenous fertilizers like Urea, while minimizing the loss of Nitrogen by virtually eliminating the risk of volatility, nitrification and leaching. The Epinimbin in N-GUARD has maximum nitrification inhibition potency followed by Desacetylnimbin, Salannin, Desacetylsalannin, Azadirachtin and Nimbin.

Target Audience: The main audience would be growers of Maize, which requires plenty of N.

Objectives:

1. To evaluate the comparative effects of N-Guard (nitrification-inhibitor) coated, uncoated, and split dose applied urea based on better nitrogen-use-efficiency
2. Assessment of yields as affected by the use of the reduced dose of coated urea in comparison to uncoated urea at full dose
3. To compare the nitrogen-status before application of N-Guard in form of coating, after application and at/near harvest
4. To determine the Benefit : Cost ratio.

Observations:

Fertiliser Use Efficiency

The best fertilizer (nitrogen) use efficiency resulted from N-Guard coating @ 7.59 ml/Kg with a harvest index of 37.1%

Economics

We discovered that N-Guard coating @ 7.59 ml/kg resulted in the highest B:C ratio of 0.73:1

Nitrogen Status

The soil samples collected from various plots and analysed in the laboratory revealed that N-Guard coating @ 7.59 ml/kg treated plots had the maximum available nitrogen status in the soil. (58.7% increase)

N-Guard coating @ 7.59 ml/kg resulted in 37% stabilisation of the nitrogen in the soil through inhibition of nitrification.

Pest and Nematode control

The trial revealed that N-Guard coating @ 7.59 ml/kg controlled:

49.2% of Stem borer- *Chilo partellus*

25.9% diseases (Maize leaf blight, Turicum leaf blight, Stripe downy mildew)

68.4% control of the plant parasitic cyst nematodes in corn