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## Field evaluation of slow-release nitrogen fertilisers and real-time nitrogen management of spring maize in Nepal

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### Abstract

Several innovative fertilisers and application methods, along with different support tools have been developed to enhance precision in nitrogen fertilisation, but their comparative study on maize is yet to be done in Nepal. Thus, we evaluated different slow-release Nitrogen fertilisers and decision-making tools compared with the common urea on their effectiveness in economic return, nitrogen use efficiency (NUE), and grain yield of spring maize (*Zea mays* L.cv. Rampur Hybrid-10). A field trial was conducted at Dang Valley of Nepal in a Randomised complete block design with three replications and seven treatments: N omission- 0 kg N ha<sup>-1</sup>, recommended dose (120 kg N ha<sup>-1</sup>), N180(180 kg N ha<sup>-1</sup>) and Leaf Color Chart based N management (LCC-kg N ha<sup>-1</sup>), Green Seeker (GS-143 kg N ha<sup>-1</sup>), Polymer-Coated Urea (PCU- 90 kg N ha<sup>-1</sup>), Urea Briquette-deep placement (UDP- 90 kg N ha<sup>-1</sup>). N application based on decision support tools (LCC and GS) and innovative fertilisers (UDP, PCU) yielded 17.35–45.81 % more grain yield than the recommended dose (RDF). The real-time nitrogen application through LCC and Green Seeker and slow release N fertiliser (PCU and UDP) resulted in higher agronomic efficiency of nitrogen-AEN (21.30–27.82 kg grain kg<sup>-1</sup> N) compared to RDF (12.15 kg grain kg<sup>-1</sup> N) and N180 (19.87 kg grain kg<sup>-1</sup> N). UDP resulted in higher grain yield 5.25 t ha<sup>-1</sup>), partial factor productivity of N-PFPN (58.37 kg grain kg<sup>-1</sup> N), and AEN (27.82 kg grain kg<sup>-1</sup> N) while reducing N dose by 25 %. Based on the economic feasibility and ease in the application, urea briquette (UDP) and Leaf Color Chart (LCC ) based N application seems promising in Nepalese conditions. However, their effectiveness should be validated in diverse agroecology, soil, and climatic conditions for a general recommendation.

**Keywords:** decision support tools, briquette urea, green seeker, leaf colour chart, maize, nitrogen use efficiency, polymer coated urea