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The case for static range nitrogen management in Northwest U.S. sugarbeet production.

Nitrogen (N) management is important in sugarbeet (*Beta vulgaris*) production because it affects yield and quality. As Northwest U.S. sugarbeet yields continued to increase over the preceding decades, crop response data suggested that the established and utilized yield goal N management (YGNM) method for determining N requirements was leading to the over application of N fertilizer. This paper evaluates N supply effects on sugarbeet yields from three studies (26 research site-years) from 2005 to 2021. The use of an alternate static range N management (SRNM) approach was compared to the historically used YGNM approach. Historical data (1977-2021) shows that the N supply needed to produce maximum yields is within a narrow range. The N supply range required to produce maximum root and sucrose yields was 197 to 231 kg N ha⁻¹. Our analysis shows that over time the YGNM approach has increasingly over recommended N supply. At the 12 responsive site-years, the YGNM N recommendations supplied an average of 61 kg N ha⁻¹ more than needed to maximize yield. Over 80% of fields in the Amalgamated Sugar Company (ASCO) growing area are over supplying N relative to the SRNM range. Data suggests N supply affects sugarbeet quality factors to a lesser degree than historically thought. Nitrogen supply did not affect root yields in 14 of the 26 site-years, likely a result of high in season N mineralization and other microbiome effects. We recommend that SRNM (200 to 230 kg N ha⁻¹) replace YGNM for sugarbeet production in the Northwest U.S.