

DELAYED-RELEASE NITROGEN FERTILIZER EFFECTS ON IN-SEASON SOIL NITROGEN FOR MICHIGAN SUGARBEET PRODUCTION

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Abstract

Delayed-release N fertilizers have received attention for Michigan sugarbeet production as producers seek to improve the timing of N availability to better match plant demand and to maximize plant N use efficiency. The N release characteristics of these products are particularly important in sugarbeet production, where excessive N availability late in the season can have adverse impacts on crop quality. The objective of this research was to evaluate delayed-release N fertilizer sources, alone and in combinations with conventional N fertilizers, on sugar beet yield and quality. In this paper, the effects of delayed-release N fertilizers on in-season soil N are evaluated for two sites in 2007 and 2008. Fertilizer sources included two conventional fertilizers, urea and urea ammonium nitrate solution, and two delayed-release fertilizers, polymer-coated urea (PCU) and liquid polymer N (LPN). Treatments were arranged in a RCBD with 4 replications and included a no-N control and seven source/combinations at two N rates (90 and 124 kg N ha⁻¹). Soil samples (0-15 cm) were collected on 10-14 day intervals throughout the growing season for determination of soil NO₃-N and NH₄-N. These values were combined for total soil N. Soil N concentrations in 2007 and 2008 did not generally differ between 90 and 124 kg N ha⁻¹ rates throughout the season. Treatments of 90 kg N ha⁻¹ are presented for brevity. Among treatments including delayed-release N products, increasing proportions of conventional N increased soil N early in the season. When compared to treatments with only conventional N, treatments containing 30% delayed-release N generally performed similarly to treatments with 100% urea. In several instances, particularly early in the season, these 30% delayed-release treatments had lower soil N than 100% urea treatments. Results do not indicate consistent significant differences between delayed-release and conventional N products at mid-season timings, though ultimate determination of delayed-release product suitability in sugarbeet systems will depend upon yield and processing quality effects.

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