Effects of Method and Level of N Fertilizer Application on Soil pH, EC, and Availability of NH₄⁺ and NO₃⁻ in Blueberry

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Background
Most blueberry fields are irrigated by sprinklers or drip. While both are effective, a major advantage of drip is the capability to fertigate (i.e., apply water-soluble fertilizers during irrigation). Numerous fertilizers are available for fertigation, but a product becoming increasingly popular is urea-sulfuric acid. This product, sold under various names such as N-PHURIC is well suited to blueberry because 1) the urea breaks down quickly to NH₄⁺ and 2) the sulfuric acid helps continuous fertigation to additional N. In fact, 47-50% of the plants died (due to salt stress) when fertilized at 150 kg·ha⁻¹ N with granular fertilizer. None died with continuous fertigation. By year 2, continuous fertigation produced the largest plants at 100-150 kg·ha⁻¹ N.

Materials and Methods
- Sixteen treatments were applied to 0.24 ha of 'Bluecrop' blueberry planted in April 2006. Treatments included: 4 fertilizer methods (2 fertigation & 2 granular fertilizer) x 4 rates of N application (0, 50, 100 & 150 kg·ha⁻¹ N).
- Fertilization treatments were irrigated by drip and injected with liquid urea fertilizer; continuous fertigation was applied weekly from bud break to 2 months prior to the end of the growing season while split fertigation was applied as a triple-split in April, May, and June.
- Granular fertilizer treatments were fertilized with a triple-split (April, May, & June) of granular (NH₄)₂SO₄ and irrigated by microsprays (simulates sprinklers) or drip.

Results and Discussion
- Canopy cover increased with N application, but the response differed among application methods (Fig. 1). In year 1, continuous fertigation produced the smallest plants at 50 kg·ha⁻¹ N and the largest at 150 kg·ha⁻¹ N. Leaf N analysis (data not shown) indicated that the other methods were less responsive than continuous fertigation to additional N. In fact, 20-23% of the plants died (due to salt stress) when fertilized at 150 kg·ha⁻¹ N with granular fertilizer. None died with continuous fertigation. By year 2, continuous fertigation produced the largest plants at 100-150 kg·ha⁻¹ N.
- Soil pH was usually lower with sprinklers than with drip, even when no N fertilizer was applied; however, soil pH was also reduced with higher N applications and, in fact, was very similar between continuous fertigation and granular sprinkler treatments when 150 kg·ha⁻¹ N was added (Fig. 2).
- Granular N application maintained much higher NH₄⁺ concentrations than either of the two fertigation methods (Fig. 3). With granular fertilizer, concentrations peaked immediately after application, reaching levels as high as 138 ppm with drip and 662 ppm with sprinklers. Fertilization treatments, by comparison, never exceeded 10 ppm at any time during the season, even when plants were split fertigated. Granular fertilizer also resulted in higher concentrations of NO₃⁻ (data not shown), but since the ability of blueberry to acquire NO₃⁻ is limited, this may lead to more N leaching.
- Electrical conductivity (salinity) was also higher with granular fertilizer applications (Fig. 4). Blueberry is sensitive to ECₑ >1.5-2.0 dS·m⁻¹. Electrical conductivity was often >2.0 dS·m⁻¹ when granular fertilizer was applied but always <1.5 dS·m⁻¹ with continuous fertigation.

Conclusions
Early results indicated that fertigation in a new blueberry field was less efficient (i.e., less plant growth per unit of N applied) than granular fertilizer application when a low rate of N fertilizer was applied (50 kg·ha⁻¹), but it produced more growth when higher rates were applied (100-150 kg·ha⁻¹). Fertilization likely increased growth over granular fertilizer by reducing salt stress and maintaining safe and optimum levels of NH₄⁺ within the root zone throughout the growing season. This study will continue for at least 3 more years to determine the effects of each treatment on fruit production.

Reference: