

# Study recommends strategies for improved management of fresh market spinach

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Throughout California's fertile central coast region, fresh spinach is a high-production, high-value crop. Spinach can be finicky, requiring sufficient nitrogen fertilizer and irrigation to ensure ideal growth, and to meet industry quality standards such as its defining deep green color. These production practices—combined with a shallow root system and the crop's intensive production cycle—can increase the potential of detrimental nitrate leaching. Recent water quality monitoring in the region has found widespread incidences of NO<sub>3</sub> levels that exceed the Federal Drinking Water standard. As a result, growers have come under increasing pressure to improve crop nutrient use efficiency (NUE), and thereby minimize NO<sub>3</sub> losses from production fields. In an effort to inform future spinach production practices, scientists Aaron Heinrich, Richard Smith, and Michael Cahn evaluated spinach nutrient uptake and water use in the Salinas and San Juan Valleys of California.

The team explained that spinach producers can improve nitrogen use efficiency by applying fertilizer at the optimal time and rate to match crop nitrogen uptake, but that data needed to make these critical fertilizer decisions was not available prior to their study. "No studies had evaluated high-density planting of clipped or bunched spinach grown on 80-inch beds," said lead author Aaron Heinrich. "Our study was specifically designed to provide data on the nitrogen uptake characteristics of spinach and to evaluate ways to improve nitrogen fertilizer management."

Heinrich, Smith, and Cahn evaluated grower fertilizer programs, and

measured spinach nitrogen uptake over an entire production season with a range of [soil conditions](#), climatic conditions, and cropping histories. They also conducted four replicated fertilizer trials of first—and second-cropped fields.

"Over the growing season, NO<sub>3</sub> levels in the soil can build up due to a combination of unused fertilizer and mineralization of [crop residue](#) and soil organic matter," the team reported "Our evaluations showed that soil NO<sub>3</sub> testing can be used to improve the nutrient use efficiency of spinach. We found that soil testing would be most effective in spinach production at two critical points: at-planting, and before the midseason fertilizer application when nitrogen use by spinach greatly increases." The comprehensive report, including additional implications for [nitrogen fertilizer](#) management of fresh market spinach, can be found in the June 2013 issue of *HortTechnology*.

**More information:** The complete study and abstract are available on the ASHS *HortTechnology* electronic journal web site: [horttech.ashspublications.org/...nt/23/3/325.abstract](http://horttech.ashspublications.org/...nt/23/3/325.abstract)

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