New research informs California strawberry production practices

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SALINAS, CA—In the coastal valleys of central California, where more than 80% of the United States' strawberry crops are grown, there is developing concern about the impact of these vast production systems on groundwater contamination. According to a study published in the August 2013 issue of *HortScience*, changes in growers' cultural practices and the introduction of new cultivars has increased strawberry yields in the region by 140% during the past 50 years. But as crop yields have increased, water quality has diminished; water quality monitoring in these coastal valleys has shown that groundwater often exceeds Federal drinking water standards. Strawberry growers are facing increasing regulatory pressure to improve their management practices in order to protect groundwater.

Looking for ways to help strawberry producers address these critical issues, Thomas Bottoms and Timothy Hartz from the Department of Plant Sciences at the University of California, Davis, along with Michael Cahn and Barry Farrara of the University of California Cooperative Extension in Salinas, studied nitrogen (N) fertilization and irrigation management practices in fall-planted annual strawberry (Fragaria x ananassa Duch.) fields. Their multidimensional research was designed to determine soil mineral nitrogen, monitor irrigation applied, and estimate crop evapotranspiration. They also surveyed growers regarding their nitrogen (N) fertilization practices. "Our primary objective was to document plant and soil nitrogen dynamics (in annual strawberry production) under the environmental conditions and current grower management practices of the central coast region of California," said

corresponding author Timothy Hartz. "Additionally, we evaluated strawberry response to preplant controlled-release fertilizer (CRF) application rates in three commercial field trials."

The researchers determined that strawberry biomass nitrogen accumulation showed a consistent pattern across fields with limited N accumulation from fall transplanting through March, followed by a consistent rate of crop N uptake through the rest of the production season. "Our research determined that current nitrogen fertilization practices did not efficiently match the crop N uptake pattern observed," Hartz said. He explained that in California's central coastal region, most strawberry fields are planted after vegetable crops. "These fields typically have significant residual soil mineral nitrogen. Therefore, justification for preplant controlled-release fertilizer (CRF) in this production system appeared to be to ensure N availability throughout the winter, when NO3-N leaching by rainfall is possible. However, the replicated trials showed that preplant CRF rates had a minimal effect on strawberry nitrogen accumulation through the June sampling, by which time the vast majority of controlled-release fertilizer nitrogen had been released."

The researchers' evaluation of irrigation practices showed that efficient drip irrigation management was demonstrated in many fields. "In only one of the nine highest-yielding fields was seasonal irrigation more than 120% of evapotranspiration. The consistency of crop N uptake over the spring and summer provided a guideline for N fertigation. Adjusting for higher fruit yield potential under California conditions, this supports prior research that found N fertigation averaging 0.5 to 0.9 kg/ha per day to be adequate for peak production."

"Our results suggest several ways in which N management could be improved in this production system," the authors wrote. "The replicated controlled-release fertilizer (CRF) rate trials indicated that routine use of

high CRF rates was not an efficient practice. Reducing CRF rates, particularly in heavier textured soils that are less easily leached, could substantially improve N use efficiency."

More information: hortsci.ashspublications.org/c … t/48/8/1034.abstract

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