Nitrogen management studied in greenhouse pepper production

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As consumer demand for year-round fresh produce increases, vegetable and fruit producers are facing significant environmental and sustainability issues, and are being challenged to examine traditional production practices in order to improve product quality while limiting environmental impact. A recent focus on both the positive and negative effects of nitrogen applications has researchers across the globe working to find methods that can increase crops' "nitrogen use efficiency" (NUE) to contribute to more sustainable, responsible agricultural practices. A study published in *HortScience* contains strategies for increasing NUE in greenhouse bell peppers, and demonstrates how the environmental impact of intensive agriculture can be minimized without harming fruit yield or quality.

Nitrogen, the most important and widely used agricultural nutrient, is also a major environmental contaminant. In many regions increased levels of nitrate found in groundwater have been attributed to the high rates of nitrogen fertilizer applied to surrounding crops. But sufficient nitrogen—an integral part of protein and chloroplast structure and function in plants—is essential for plant growth and development. According to Hagai Yasuor of the Gilat Research Center in Negev, nitrogen deficiency has been studied on the majority of horticultural crops, but the effects of an oversupply of nitrogen are not as widely understood. Yasuor and colleagues designed a study to investigate ways to reduce environmental pollution by increasing nitrogen use efficiency in vegetables without negatively affecting fruit yield or quality.

The scientists used bell pepper (*Capsicum annum* L.) in a case study for intensive vegetable cropping. "Pepper production is becoming commercially important in various regions of the world, including Israel, Spain, southern Europe, and north Africa, where the crop is grown from fall to spring in greenhouses and net houses," the authors explained. They selected two pepper cultivars with different growth habits for the study, and drip-irrigated the greenhouse plants with solutions containing four different nitrogen concentrations. They then measured fruit yield, quality, and nutritional value of all plants.

"We found that maximum yields occurred when peppers were irrigated with N at 56.2 mg·L-1," Yasuor said. "Higher concentrations of nitrogen loaded more nitrogen into the environment, while the 56.2-mg·L-1 concentration was almost completely taken up and used by the plants." The experiments also showed that nitrogen treatments had no significant negative effect on pepper fruit physical or chemical quality, including sugar content and acidity. Additionally, reduced nitrogen application did not affect nutritional quality components of the pepper fruit such as beta-carotene and lycopene content, nor did it reduce total antioxidant activity.

"Our results demonstrate how the environmental impact of intensive agriculture can be minimized without harming fruit yield or quality by reducing nitrogen application level and adopting cultivars with improved nitrogen use efficiency," the authors concluded.

More information: The complete study and abstract are available on the ASHS *HortScience* website: hortsci.ashspublications.org/c … /48/10/1241.abstract

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